Rivalry and Cooperation:

How the Japanese Photography Industry Went Global

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Summary

This thesis analyzes the postwar political economy of the global photography industry, i.e. camera/lens and film, up to 1995 and finds that the Japanese industry has met unprecedented success. The question addressed in this thesis is: who drove the success of the Japanese photography industry, the government or firms? The words 'rivalry' and 'cooperation' are used in this thesis because they most aptly describe the three main relationships in the photography industry during the postwar period: bureaucrat-politician, government-industry and firm-firm. Cooperation and rivalry always existed in these relationships, but one often took precedence over the other.

The camera/lens makers in Japan's photography industry benefited from cooperative relationships through export promotion and import protection policies from 1950 to 1973. Export promotion was effective because Japanese camera/lens firms began to 'export' to US military postal exchanges in Japan during the Allied Occupation (1945-1952). After that time, the US market was wide open to Japanese exports due to Japan's balance of payments problems and America's mounting security concerns in Asia. Exports of cameras/lenses to the US and Europe expanded throughout the 1950s and 1960s, while photographic film manufacturers (who also produced cameras/lenses) caught up technologically and enjoyed a protected domestic market for film. After 1974, rivalry increased in the three main relationships primarily due to changes in the international trading regime and within Japan. In particular, firm-firm rivalry in cameras/lenses and film grew throughout the 1970s and intensified during the 1980s as new technological advances raised the stakes for global market shares.

This thesis shows that some firms have been successful *despite* government involvement in the industry, while others have been successful *because of* it. Cooperation between the government and industry was important in the early years because of the tight controls placed on industry (up to the early 1970s). But the influence of the government waned as the firms within the photography industry went global and rivalry among firms increased. Additional sectoral studies of Japan's early export industries (e.g. sewing machines, bicycles, clocks/watches) are needed to provide additional evidence of the extent to which there was cooperation and/or rivalry in the three main relationships in Japan's postwar political economy.

AE	automatic eye
APS	Advanced Photo System
CERA	Camera Engineering Research Association (Japan)
DoC	Department of Commerce (US)
EE	electronic eye
ESB	Economic Stabilization Board
FP	focal plane (shutter camera)
GATT	General Agreement on Tariffs and Trade
GEH	George Eastman House
GHQ	General Headquarters (of the Allied Occupation of Japan)
IC	integrated circuit
IIL	integrated injection logic
IL	interchangeable lens
IMF	International Monetary Fund
IMP	International Museum of Photography
ISO	International Standards Organization
JCIA	Japan Camera Industry Association
JCII	Japan Optical Instruments Inspection and Testing Institute (originally Japan Camera Inspection Institute)
JETRO	Japan External Trade Organization
JMDC	Japan Machinery Design Center
Keidanren	Keizai Dantai Rengokai (Federation of Japanese Businesses)
LDP	Liberal Democratic Party
LS	lens shutter (camera)
MCI	Ministry of Commerce and Industry (Japan)
MITI	Ministry of International Trade and Industry (Japan)
MoF	Ministry of Finance (Japan)
OECD	Organization for Economic Cooperation and Development
OEM	original equipment manufacturer
OIMA	Optical Instruments Manufacturers' Association (Japan)
PIDA	Photographic Industry Development Association (Japan)
PSMA	Photo-Sensitive Materials Manufacturers Association (Japan)
PMA	Photo Marketing Association, International
PX	post exchange (US)
SLR	single-lens reflex (camera)
TTL	through-the-lens (exposure meter)
VLSI	Very Large-Scale Integration
WB	World Bank
WTO	World Trade Organization

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1. Overview

Introduction

The question addressed in this thesis is: who drove the success of the Japanese photography industry, the government or the firms? There are at least three reasons why this question should be asked. First, the spectacular rise of the Japanese photography industry since 1945 has largely been ignored. The popular perception in Japan and the United States is that the industry was not on the receiving end of beneficial Japanese government policies as were other more strategic industries, e.g. steel, automobiles, computers and semiconductors. This is a myth and the story that unfolds throughout this thesis reveals why.

Second, there has been little trade friction between Japan and the US in photographic products, at least until recently. The sudden surge of interest in the 1995 Section 301 (of the US Trade Act of 1974) case brought by Kodak against Fuji Photo Film which subsequently was turned into an early test case of the World Trade Organization (WTO) process brought by the US government on behalf of Kodak against the Japanese government and Fuji is evidence of how bilateral trade disputes can affect those industries which are perceived as important. These perceptions color the choice of cases which are considered worthy of academic analysis.

The 1960s camera and lens battle between Japanese and West German manufacturers went largely unnoticed by the English-speaking community. This was perhaps because of the different structures in the Japanese and US photography industries and because most accounts of the battle were not written in English. Today, however, the battle is in photographic film, an area

where the US has an important industrial presence. And suddenly, as with so many other industries that have fallen prey to US-Japan trade disputes, everyone is interested in how the Japanese photography companies have become such formidable, global competitors.

Third, little about the twentieth-century evolution of the Japanese photographic industry has been written in English. And that which does exist often suffers from short time horizons, a fascination with the art of Japanese photography, or is merely out-of-date.[1] General studies of the 'world' photography industry tend to focus on history, often confining the time frame to the nineteenth century when technological evolution was dominated by European and later American contributions.[2] One notable example is the work of Reese V. Jenkins (1975), whose research concentrates on the institutional and technological changes in the industry in the United States up to 1925.

The lack of adequate source material in English necessitated the use of an array of Japanese sources. Technical explanations and the trade war between Japan and West Germany during the 1960s in cameras and lenses are two examples of information found mainly in Japanese.[3] Finally, interviews with senior businessmen, bureaucrats and scholars were carried out to enhance the often dry company and industry histories that also lacked analytical perspective. Because of the popular perception in Japan that the photography industry is uninteresting as a subject of government-industry interaction, additional interviews were often necessary. Fortunately, everyone seemed to have a special warmth in their hearts for the 'friendly industry.'

There were, however, two problems in this research project that are not peculiar to this industry, but to all studies of this kind. One is the sheer

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[1] Good but limited studies include Bekemeyer (1993), Bernstein (1965), and Miyabayashi (1963).

[2] Art books take up industrial development only to a very limited extent (cf. Gernsheim, 1986; Dower, 1971; and Putzar, 1987). Rosenblum (1984), who presents a 'world history,' devotes one six-page section to technological developments after 1910 (both in cameras and film). Fuji Photo Film is only mentioned in passing and innovative Japanese products in both cameras and film are completely ignored.

[3] The addition of German-language sources might make an interesting future research project.

number of companies operating in this industry which fluctuated widely over the period studied and the other is the impact on the industry of technological change over time. Because technological change directly affects the present and future prospects of the photography firms and because the firm's products and profits often directly affected the technological level of the company, these two issues are discussed together. Technological contributions to the advancement of industry are often divided between 'research' and 'development' (cf. R. R. Nelson, 1984; Florida and Kenney, 1990). In the US, technological 'breakthroughs' are what count, according to Richard Florida and Martin Kenney (1990) but this has come at the expense of the 'follow through,' i.e. the development aspect of the research. They say that true basic research is what counts in the US, not small innovations or the development of breakthrough technologies into money-making consumer goods. The contributions of Japanese photography firms to the advancement of cameras, lenses and film are commonly placed in the 'follow through' category. It is not a strategic industry, so it is technologically unimportant. The myth that Japanese firms did not contribute technological innovations to the photography industry is explored below and throughout the thesis.

The photography industry is composed of firms that are comprehensive photographic goods producers and those that specialize in goods based on optics technology. Fuji Photo Film and Konica are in the former group, and they both look very much like their two global competitors, Kodak and Agfa. (Agfa, a member of the Bayer Group, is currently stressing the chemical rather than the mechanical side of its business.) These companies are the leading and the largest manufacturers of photographic film in the world, what today is a highly oligopolistic, global business.

The other firms in the photography industry based their strengths on their core competence in optics. They currently are Asahi Optical (makers of the Pentax brand), Canon, Kyocera (which purchased Yashica in 1983), Minolta, Nikon and Olympus. All are leading manufacturers of 35 mm

cameras, but there are several smaller niche market firms which manufacture large-format (60 mm) cameras and lenses (e.g. Horseman, Mamiya OP and Zenza Bronica of Japan and Hasselblad of Sweden). This thesis concentrates on the mass market manufacturers although some references will be made to the niche firms which mainly supply professional photographers.

Instead of joining the fray in photographic film manufacture, the Japanese 35 mm camera and lens makers chose to strengthen their positions by competing in a range of quite diverse products especially after 1970. They can generally be split into two groups: office equipment and medical-use cameras/lenses. Unlike the US firms (e.g. Kodak and Polaroid) which found their strength in photographic film, these Japanese firms were heavily influenced by German and Austrian optics technology in the early twentieth century (see chapter three). The influence is clear in the similar division of both the European and the Japanese industries between film manufacturers on the one hand and camera/lens makers on the other.

Today, this similarity still exists despite the devastation among European firms caused by the invasion of Japanese 35 mm cameras in the 1960s. Leica (the recently reorganized firm of Ernst Leitz) still produces cameras but has also branched out into other fields. Zeiss exited the consumer camera business (managed by its subsidiary Zeiss Ikon) in 1972 to concentrate on very high precision optics for medical and scientific use. Rollei was sold (primarily as a brand name) to Samsung of Korea and depends only on small-scale camera and lens production in Germany today. Sweden's Hasselblad, the world's leading large-format camera maker, continues to order its high-priced, high-quality custom lenses from German manufacturers, mainly Schneider and Zeiss. Manufacturers of comprehensive photographic goods (i.e. cameras, lenses and film) compete directly with manufacturers of cameras/lenses in Japan. The top seven camera makers have with few exceptions been the five leading camera firms plus the two comprehensive manufacturers. In recent years, American and European firms competed most successfully with the

Japanese photographic firms in photographic film and business machines, especially in photocopiers.[4] The introduction of digital imagery has brought a host of new competitors from the electronics industry; these companies have electronics rather than optics as their core technologies.

Change over time in technology and industry structure has made this thesis difficult to organize and even to analyze and interpret. The definition of the photography industry varies from country to country. The leading firms have changed over time, and the goods in which they competed have changed as technology has progressed. If we look at the modern 35 mm compact camera with all of its electronic devices to help us take fool-proof pictures and compare it to the precision machinery of the first Leica, the 1925 prototype on which the modern 35 mm camera was based, the impact of technological advancement is clearly evident. Furthermore, if we consider the modern photographic lens produced entirely of light-weight plastic with lens clarity exacted by computer calculation and compare it to the hand-made optic glass and metal lenses of just 20 years ago, the impact of modern technology is starkly underlined. Additional examples abound. It is in this area of technological change that the central question of this thesis, whether it is photography firms or the bureaucracy that shaped the evolution of the Japanese photography industry, has been most sharply posed.

Other important factors considered in this thesis are marketing, the rise of leisure time, the growth of disposable incomes in Japan, the US and Europe, the rise of a 'consumer' culture. Timing, which some might call luck, also played an important role in allowing Japanese firms access to the US market in the early postwar years and then increasing access to the European market as trade barriers fell and economies expanded (cf. Spero, 1990). Demand in the Japanese market was also important for stimulating sharp competition among the photography firms and forcing them to compete for market share in terms

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[4] Xerox and Fuji Photo Film have a Japanese joint venture called Fuji Xerox. Ricoh, a photographic goods manufacturer dating back to its prewar origins in the Riken Group, leads in photocopiers.

of new, innovative products. That competitive spirit was first developed in overseas markets (in the US in the 1950s and in Europe in the 1960s) where the main rivals were the West German firms, not their fellow Japanese exporters. Rather than competing with each other, the leading exporters more or less cooperated on a strategy to overtake the West German firms. The threat of the West German firms galvanized the Japanese firms to work together (cf. Fransman, 1990; Fruin, 1992).

Very quick expansion in the Japanese industry had a crippling effect in the early 1960s which had to be managed through a year-long recession cartel (see chapter four). The leading exporting firms agreed to minimum prices and to cut back production temporarily. Fortunately for the exporters their cameras/lenses — and their prices thanks to a favorable exchange rate — appealed to a growing population of US and European consumers. Due to the postwar expansion, the market for photography grew as people in industrialized countries enjoyed more leisure time, rising levels of disposable income and later a booming holiday/tourist trade. Photography became a popular medium of communication (professional as well as amateur) and demand was stimulated by a constant stream of new products for photographers of all skill levels.

However, as traditional markets became saturated, firms came to rely more on marketing to 'create' demand for new products boasting new film formats or new automated gadgets. And rivalry among firms for market shares increased. This was true for both the camera/lens makers and for the film makers even though the latter supplied the highly profitable means for making pictures (i.e. the film) and were therefore somewhat freer from the stiff competition that goes with consumer goods manufacturing.

Preferences in the US, Europe and Japan for photographic goods differed and have changed over time in each country/region (see chapters four and five). American consumers, for example, traditionally preferred less expensive, easy-to-use cameras in a variety of film formats which were

supplied by Kodak and Polaroid. Europeans tended to purchase more complex cameras and precision lenses for producing high-quality photographs from 35 mm and larger (i.e. 6 x 6 cm and above) film. These types of products were made by, among others, Zeiss, Leitz, Rollei and Hasselblad. Like Europeans, Japanese consumers were inclined to purchase complex cameras, but they showed a preference for standardized, 35 mm mass market goods which over time became compact and very high tech. These were supplied by Canon, Nikon, and Minolta, among others.

Today, consumer preferences appear to have converged, and markets offer goods in all of these segments. Specialists and enthusiasts choose very expensive, hand-crafted photographic equipment, however, most consumers opt for less expensive, but high quality, mass produced photographic goods. Japanese firms looked for the mass market, and were able to fill the demand fortuitously created by the postwar economic expansion. Competition among Japanese firms was intense, so they offered a large variety of photographic goods, squeezing the low-end of the market as prices fell. Manufacturers were keen to adopt new technologies, manufacturing processes and materials, and to expand their profits by manufacturing high volumes at low cost.

Myth: No government involvement occurred here

The photography industry has a long history, one that dates back much further than the postwar period which is the focus of this thesis. Konica (established in 1876 as Konishi Honten) acted as a sales agent for imported photographic products, mainly from Eastman Kodak (*Camerart*, 1987). Modeling itself after Kodak, Konica became Japan's first comprehensive photographic goods manufacturer, producing the Cherry Hand Camera (box type for dry plates) in 1903 and introducing their Sakura brand film 25 years later. In response to a shortage of imported optics (mainly from Germany) during World War I, the government supported private efforts to build up the

country's capability in optics research and manufacture (Lewis, 1991, pp. 17; 28-30; 38). Companies established at that time include: Asahi Optical (then Asahi Kogaku Goshi Kaisha, later known for its Pentax brand name), Nikon (then Nippon Kogaku), Olympus (then Takachiho Seisakusho) and Topcon (then Tokyo Kogaku or Tokyo Optical; a subsidiary of Toshiba since 1964).

From the early years of the industry, the government, influenced by the military, played a strong role (see chapter three). In the first decades of the twentieth century when so many industries were growing quickly and so much technology was being imported from abroad, this was not unusual (Fruin, 1992, p. 38). Many other photographic companies were established during the interwar period; the 1930s was a particularly entrepreneurial decade. By the early 1940s, however, all civilian production was converted to military use and civilian consumption of photographic goods was restricted. As in other industries in Japan (and as in the photography industries in every other country involved in WWII), military demand was crucial to each firm's survival.

During the Allied Occupation of Japan (1945-1952), all industrial production was re-converted back again from military to civilian production. US policy was based on the idea that Japan should never again have the capacity to wage war. The camera/lens and film companies were encouraged to recover quickly as 'peace industries,' and formed part of the backbone of industries on which Japan's postwar recovery was based. Designated as an 'important commodity' industry by the Japanese government in 1950 (Management and Coordination Agency, 1950, pp. 150-151), manufacturers of photographic goods enjoyed the dual benefits of export promotion and import protection *before* these policies became standard features of the so-called '1955 system.' Chalmers Johnson (1982, p. 240) identified "an elaborate trade promotion apparatus" as one of the institutions of high-speed growth (the 1955 to 1961 period) in his seminal book on Japan's industrial policy and 'developmental state.'

Despite being on the receiving end of the obvious benefits of promotional policies, the photography industry has nevertheless been consistently overlooked as a beneficiary of government policy. The most likely reason for this oversight is that it was such an early case of government involvement that it did not seem to belong in the category of what is usually called 'Japanese industrial policy.' The main problem is that 'government' in those days was not the Japanese government so much as the US government. It was the General Headquarters (GHQ) under the leadership of General George MacArthur, the Supreme Commander of the Allied Powers (SCAP). Immediately after the war, GHQ concentrated on democratizing Japan and allowing economic performance to return to prewar (1930-31) levels (Vestal, 1993; Yamamura, 1967). However, the depth of the challenge facing Japanese economic recovery was not fully recognized until the late 1940s when the magnitude of Japan's future economic dependence on the US and the potential drain to the US economy that would result was acknowledged (Tsuru, 1996).

Japan had to raise export volumes to balance its vital US imports of food, fertilizer, petroleum and medical supplies (Cohen, 1949, pp. 495; 498). But the main problem, according to Jerome Cohen, was that Japan's main prewar trading partners in Asia did not want to have anything to do with Japan's postwar economic recovery if it was to be at their own expense. First, many Asian countries were in the throes of becoming sovereign nations, after the departure of their European colonizers and the defeat of Japan. Second, the situation was far from stable economically or politically and due to the legacy of the war, Japanese goods were unlikely to be welcomed there. Third, there was a desire in many Asian countries to concentrate on their own economic development. Finally, they were suspicious that Japanese goods would once again flood their markets as had happened in the interwar period.

It was not only Japan's prewar trading partners in Asia who were concerned. Japanese trade patterns in the interwar years had given an impression in the US and Europe that Japanese firms tended to flood markets

with goods, often selling them at prices below cost in order to gain market shares.[5] This was especially true in the case of Japan's textile industry which competed directly with India, Pakistan, and Australia.[6] Britain was especially vocal in its complaints during the 1920s and 1930s about how Japanese companies bought raw cotton from India, and then turned around and sold fine-quality textiles at very low prices back to India, that is, to British Commonwealth markets (cf. Fletcher, 1989). Later in the 1960s, it was the US that complained of "floods of 'unfairly competitive' cheap Japanese textiles" (Dore, 1986, p. 11). During the postwar period, the same pattern was repeated. Export markets were flooded by Japanese consumer goods, e.g. cameras/lenses and sewing machines, due to Japan's export promotion policies and an advantageous exchange rate until the early 1970s (cf. Tsuru, 1996) (see chapters three and four).

Japan was heavily dependent on Asian countries for its balance of trade during the prewar years. In 1936, according to Cohen (1949, p. 503), they "supplied nearly 60 percent of Japan's imports and were markets for nearly 70 percent of her exports, while dollar countries (the US, Canada, etc.) received 17 percent of Japan's exports and supplied Japan with 25 percent of her imports." In the vacuum of colonial withdrawal it became clear that many of these newly independent Asian countries were not unified as 'nations,' and many had suffered under Japanese rule. In postwar Europe, the situation was quite different. The European Allies under US leadership and with US aid

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[5] Fruin (1992, p. 314) noted that this postwar characteristic was "...a 'torrential downpour' (*shuchu go-u*) of products often seen abroad as 'dumping.'"

[6] In February 1948, the editors of the Melbourne *Age* wrote: "It was determined by the Great Powers at Yalta, and later in the British Commonwealth discussions at Canberra, that in a military sense, Japan should not be allowed to menace the peace of the world again. Corresponding safeguards will now be necessary to insure against a revival of Japanese export trade of a kind that could again threaten the soundly conducted industries of Britain by ruinous competition from inferior Japanese manufacturers dumped at a fraction of cost of production under improper standards. To this extent military and economic security are interrelated and Australia, no less than Britain, must continue to exercise strict vigilance against the dangers inherent in the resumption of large-scale trade with Japan." See "Need for Vigilance in Trade with Japan," *Age*, February 24, 1948 as cited in Cohen, 1949, p. 496, footnote 187.

actively sought economic integration especially between France and Germany as a way to prevent future world wars. In Asia in 1945 to 1947, there was no equivalent of France to balance Japan's Germany.

Therefore, in the late 1940s, Japan's trading partners had changed. No longer did imports come from traditional sources in Asia, and the prospects for export growth to the new (dollar) areas were not good. Economic recovery was needed throughout Asia, but many countries, such as China, Malaya and Indochina, faced political turmoil. In 1947, Asia supplied only 6 percent of Japan's imports but purchased 66 percent of her exports, while 92 percent of Japan's imports originated in the US and only 12 percent of total exports went to the US (Cohen, 1949, p. 494). Recovery of Asian markets was crucial to Japan's own economic recovery, otherwise Japan would remain dependent on US appropriations to cover the shortfall of dollars needed to pay for imports. However, for the reasons given above, it was unlikely that Asian recovery would occur quickly enough to satisfy the United States' domestic and international political agenda, i.e. containing Communism in Asia.

As the situation in China deteriorated and the Soviets built up their east European wall of defense, the US shifted its economic policy toward Japan from sustainability at 1930-31 levels to economic recovery. By 1949, it was clear that Japan was to become the 'workshop of Asia' and the front line of the Western alliance against the encroaching Communist threat in China and other parts of Asia (cf. Nakamura, 1981). The solution to Japan's foreign exchange and foreign trade problems was to promote and expand Japan's exports to the US as quickly as possible. The US market was opened wide to Japanese imports; export promotion of Japanese goods became a matter of mutual economic and political benefit. A single exchange rate for the Japanese yen was set the same year to bring in much needed dollars to pay for imports. As the Japanese economy stabilized (although not until 1951/52), US taxpayers were progressively relieved of the burden of subsidizing exports to

Japan and the US government gained a solid ally in the Pacific.[7] With the outbreak of the Korean War the following year, this policy became all the more imperative (cf. Spero, 1990).[8]

By 1955, the year that is generally pinpointed as the beginning of high-speed growth and the 'Japanese model' of economic development, more than five years had passed since the *de facto* establishment of economic and military interdependence of the US and Japan. Many scholars of postwar Japan do not analyze what happened before 1955, choosing instead to ignore the 1939 to 1955 period as an aberration in Japan's history for statistical convenience as if to say that the policies of GHQ had been irrelevant.[9] Were they? How important was the two-year adjustment period between the end of the Occupation and the start of the so-called '1955 system?' The argument that the Japanese government was involved in promoting industries (e.g. cameras/lenses/film, transistor radios, sewing machines and bicycles) that supported Japan's postwar economic recovery cannot be understood without addressing the *whole* postwar period (see chapter two).

The early recovery of the photography industry was promoted through exports to an open US market and protected by import barriers. They were further aided by a complex exchange regime in place until 1949 when the single exchange rate was set (Nakamura, 1981, p. 36). Each item traded had a

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[7] Chalmers Johnson (1978; 1982) discusses economic problems with US subsidies and shortages of credit needed for entrepreneurial investment and recovery of the Japanese economy. Subsidies supplied through the Reconstruction Development Bank were seen as fueling inflation, which was then brought under control by Joseph Dodge's draconian measures (the most important of which was setting the exchange rate) called the Dodge Line (cf. Nakamura, 1981; Tsuru, 1996).

[8] A similar situation arose in Western Europe under GATT in order to foster economic recovery. Although the US market was open to Western European goods, these countries were allowed to limit the import of US goods and investments in exchange for going along with trade discrimination against China and the Soviet bloc (Strange, 1994, p. 187).

[9] Takafusa Nakamura (1981, p. 3; note 1), who stresses the importance of wartime controls after 1937 and the Occupation policies up to 1952, notes that others do not agree with this approach. Kazushi Ohkawa and Henry Rosovsky (1973), for example, statistically linked prewar and postwar Japanese economic development from 1935-36 to 1952-53, skipping over the 1937-1952 period. They made the numbers fit the story they wanted to tell. I believe this is insufficient reason to ignore this very important period. Tyson and Zysman (1989, pp. 62-63) also conveniently ignore the period to stress their 'Japan as neomercantilist' argument.

different rate of exchange, and since the government controlled all trade, exporting firms received a price from the government that was often much higher than the price at which it was exported (the exchange for which was usually set at 500 to 600 yen to the dollar). Imports were usually priced at 100 yen to the dollar and sold (by the government) cheaply on the Japanese market. The resulting trade deficit was made up in the Japanese government budget, which was subsidized by the US Treasury. To solve this problem, trade subsidies were given to Japanese industry to promote exports.[10]

Data on the 'recovery industries' (e.g. cameras, clocks and watches, radios, sewing machines, electric fans and bicycles) indicate that they began to flourish as export industries in the early 1950s (see chapters three and four). According to table 1.1, production of electric fans recovered most quickly of the items listed, from a prewar high of 64,780 fans produced in 1940 to 66,282 produced in 1946. Radios and sewing machines also recovered quickly (by 1946 or 1948) to levels near or higher than their prewar peaks of 1940 and 1941.

Cameras by comparison showed slower but steady recovery, with production in 1951 at 213,840 cameras just below the prewar peak in 1940. Clocks and watches and bicycles indicate that the pattern of postwar production was quite similar.[11] As we shall see in chapter four, exports of cameras grew quickly throughout the 1950s to capture large shares of the world market mainly due to the Japanese government's policy of export promotion. Because these industries were the fundamental building blocks on

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[10] Dodge called these "invisible subsidies," according to Nakamura (1981). Some calculations place the subsidies at 176 billion yen over the 1946 to March 1949 (after which the single exchange rate went into effect) period.

[11] Ezra Vogel (1985) notes that bicycles and motorbikes were promoted because the proceeds from bicycle racing were used to subsidize targeted industries, i.e. industries that the government selected to benefit from industrial policy. Another fund that was set up to channel money into targeted industries was the banana fund (Johnson, 1982). Since the government controlled all trade in the early postwar years, the banana funds came from the difference between the price of imported bananas and their domestic sales prices. This was possible because of a healthy demand for bananas, which do not grow in Japan. For how the bicycle racing funds and the banana funds were used to promote the photography industry, see chapter three.

Table 1.1 Japan's Production of Selected Items, 1935-1953 (units, unless otherwise specified)

	Cameras	*Clocks & Watches*	*Radios*	*Sewing Machines*	*Bicycles*	*Ships (tons)*	*Electric Fans*	*Binoculars*
1935	95,326	4,183,000	153,974	12,301	903,000	174,067	43,562	81,700
1936	154,648	4,864,000	427,287	40,924	1,055,000	274,784	42,228	79,200
1937	178,321	5,114,000	406,753	53,133	1,090,000	483,548	46,918	99,500
1938	187,569	3,814,000	604,463	104,204	1,080,000	464,679	43,575	45,600
1939	205,522	3,384,000	740,356	132,997	950,000	391,679	58,302	62,500
1940	218,659	3,424,000	852,903	154,402	1,245,000	401,866	64,780	60,000
1941	203,011	2,935,000	917,001	142,317	185,000	466,249	55,828	56,400
1942	133,854	1,582,000	841,301	51,129	181,000	547,051	41,200	35,200
1943	57,588	808,000	741,816	25,573	70,000	1,030,601	45,240	36,100
1944	29,548	413,000	262,372	16,047	65,000	2,198,790	2,360	60,000
1945	13,082	98,000	87,529	2,150	20,000	632,005	1,240	14,400
1946	24,145	714,000	672,676	36,912	...	143,860	66,282	37,836
1947	51,772	1,599,000	772,428	133,949	...	83,565	74,329	31,158
1948	53,016	2,404,000	769,730	165,726	337,000	162,898	72,167	47,623
1949	83,243	3,051,000	702,327	274,468	552,000	163,980	95,703	97,356
1950	117,481	2,331,000	281,602	493,038	981,000	229,761	118,804	115,970
1951	213,840	3,050,000	399,943	1,030,289	987,000	454,149	173,903	176,180
1952	357,918	3,803,000	929,126	1,260,293	1,019,000	627,064	290,879	179,510
1953	663,484	4,673,000	1,391,031	1,318,059	1,184,000	521,759	434,585	212,704

Source: Adapted from Y. Miwa (1996) *Firms and Industrial Organization in Japan* , London, Macmillan, p. 6, based on MITI (1955) *Kokogyo Seisan Shisu* (Production Indexes of Mining and Manufacturing Industries) Tokyo, MITI.

which the Japanese economy grew, they must be studied if we aim to understand the nuances of Japan's government-industry relationship.

As discussed in chapter two, some scholars (e.g. Komiya, 1988; Trezise, 1976) argue that consumer goods industries, including the photography industry (particularly cameras), were demand driven and therefore did not need industrial policies. There may be some truth to this argument in terms of overseas demand, especially initially in the US market which was then and is still the largest market for photographic goods in the world. However, demand in the Japanese market was stifled until the early 1960s in the case of cameras/lenses and the 1970s in the case of color film by high excise taxes and initially rather low levels of disposable income. (Sales of black and white film had been overtaken by color film in the mid-1960s.) Domestic demand for photographic goods was satisfied in the 1950s mainly by cheap, shoddy cameras made by up-start firms, not by the high-class cameras/lenses sold overseas. Only when average real incomes started to rise, in part due to the 1960 policy called the 'Income-Doubling Plan,' did the exporters really begin to make their mark as domestic suppliers. Notably, many of the small firms also were forced into bankruptcy.

Chapter three outlines the key roles of intermediary organizations including the industry associations and other quasi-governmental institutions. In the 1950s they were important in establishing a marketing and distribution foothold for the largest manufacturers of cameras/lenses in the US through the establishment of the Camera Information and Service Center in New York. By 1960, Japanese firms held nearly 40 percent (in value terms) of the US market and were looking to repeat this performance in Europe which was known for its diverse and comparatively closed markets. In 1963, MITI stepped in to organize the camera/lens exporters in four regional Light Machinery Centers with the other Japanese exporters of light machinery. A year later, MITI repeated this performance when the problems of domestic market oversaturation and excess capacity in the run up to the 1964 Tokyo

Olympics, and the downturn thereafter, touched off a price war. 'Excess competition' was quickly brought under control by a recession cartel and encouragement to redirect surplus production overseas, that is to Europe.[12]

Government involvement and support for the industry (e.g. helping to set up overseas distribution and building brand recognition) were important for the industry's success during these early years. Export promotion was far more important to the early success of the industry than was domestic demand because it was restrained by high excise taxes. But once the excise taxes (and thereby domestic prices) dropped to reasonable levels in the early 1960s, the Japanese market became just as crucial to the success of the photographic firms as the export market. Also important was the availability of long- and short-term financing through the government (e.g. the Japan Development Bank) and commercial banks. Without adequate financing and tax breaks on export earnings and capital investment, the industry might never have taken off. The process of export promotion and the growth of domestic market from 1950 to 1973 is the focus of chapter four.

In chapter five, it is argued that after the first oil shock of 1973-74, the government's influence in the industry waned as firms grew in size and relative wealth and as bureaucratic tools to control the economy and firms all but disappeared.[13] After the early 1970s, some firms were more reluctant to go along with government policy while others were more willing to cooperate. One indication of the growing independence of the photographic firms was their decreased dependence on bank loans. The photography industry is said to be unusual in Japan because it is relatively less dependent on horizontal *keiretsu* groupings than other industries. Certainly, there are many firms in this industry, and not all of them have strong ties to one horizontal *keiretsu* group, but these relationships can change over time and are difficult to measure (cf.

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[12] Excess competition is cut-throat pricing and other pricing strategies by firms that make an industry 'unstable.' See chapter two.

[13] Laura D'Andrea Tyson and John Zysman (1989, pp. 183-184) went so far as to write: "MITI's historic task of protecting and nurturing Japanese industries until they could compete in any market in the world is over. Japan's big businesses no longer need MITI."

Gerlach, 1992; Dore, 1986). During the 1990s, Canon and Fuji Photo Film, two firms with comparatively close *keiretsu* ties, have increased their levels of foreign ownership to as much as 40 percent.[14] Traditional ownership and borrowing structures are clearly less important now than in the past.

In short, there is wide variation across the industry. The photography firms in general have grown relatively wealthy over the period studied and in some cases, the capital-rich companies have acted quite independently from the other firms in the industry and have given little heed to government or industry association wishes.[15] Much of the expansion since the 1970s can be attributed to firms which based their growth more on market strategy than on government influence. Canon, the largest firm (consolidated net sales in 1996 (Jan.-Dec.) of ¥2,558 billion) and the largest producer of cameras (loosely affiliated with the Fuyo group), is an example of a firm which has relied on corporate strategy above all else. Nikon, a much smaller firm dedicated to the professional and semi-professional markets (consolidated net sales of ¥379 billion in FY 1997), is an example of a firm that has been less dependent on its own corporate strategy because of its close ties to the Mitsubishi group (see chapters four and five).[16]

Certain firms in the photography industry diversified their product lines by pumping profits into research and development (R&D). Relatively, however, Japanese firms have not diversified to the same extent as American ones (Fruin, 1992). Instead, they pursued product-line diversification, i.e. diversification within the firm's core competence. Some photography firms have been able to retain independence from government control while participating in joint government-industry research projects, e.g. the Very

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[14] Given the current instability of the Japanese banks, their strategies appear quite prudent.

[15] Ronald Dore (1996, p. 131) stresses the point that each firm is seen as belonging to one 'industry' and therefore one industry association. This works to facilitate communication to and from the industry and the government through the industry associations. See also chapter three.

[16] Johnson (1982, p. 287) comments, in reference to the automobile industry, that the Mitsubishi group is generally less dependent on the government since few retired bureaucrats are employed within the group's member companies.

Large-Scale Integration (VLSI) Project and optoelectronics, even as minor players (cf. Flamm, 1996).[17]

Government was active in promoting the orderly distribution of photographic goods in Japan which kept retail prices high. According to several studies (e.g. Bernstein, 1965; Miyabayashi, 1963; and Seki *et al*, 1961), it was recognized within the industry in the early 1960s that reliable wholesale and retail channels (linked to the vertical *keiretsu*) were needed to prevent distribution problems from arising. Later the same phenomenon occurred overseas after 'gray markets' had developed (Wiechmann, 1976). The pervasiveness of 'keiretsu-ization' (*keiretsuka*) in Japan's distribution system today is testimony to its effectiveness (cf. Dewey Ballantine, 1995a). However, because distribution in Japan is very costly and effectively closed to newcomers (because it is hard to change these relationships), the system has come under attack as inefficient and partly to blame for the economy's lackluster performance throughout much of the 1990s (cf. Katz, 1997).

The story of the photography industry is not limited to a discussion of government guidance (e.g. cartels, protectionism or the coddling of industry). Instead, it is one of how the government helped certain firms at certain times and how firms succeeded either *because of* government policy or *in spite of* it. The analysis stresses the role of the industry associations and other intermediaries working in between government and industry. Especially in the early postwar period, before firms had become financially strong, these intermediaries played an important role in communicating the needs of the industry to government and vice versa (cf. Dore, 1986; Tilton, 1996; and Yonekura, 1996). This thesis shows that the industry's postwar growth and success has been affected both positively and negatively by government intervention.

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[17] Kenneth Flamm (1996) notes that Canon and Nikon were able to gain the know-how to produce steppers, the optics-based technology which imprints patterns onto semiconductor materials. They both currently are world market leaders.

Myth: No technological innovation occurred here

It is still widely believed that Japanese companies have been so successful mainly because they have borrowed, licensed and copied technology from others rather than developed technology themselves. And when they have developed new technologies, many see the advancements as innovations to increase sales not to advance basic science. The artificial division between basic research and development may have served to reinforce the stereotype that Japanese innovations, for example, are somehow inferior to the grand, basic research being conducted elsewhere, mainly in the Europe and the US (cf. Florida and Kenney, 1990; R. R. Nelson, 1984). If, however, the distinction between 'R' and 'D' is truly artificial, then Japanese photography companies *have* made major contributions to the advancement of the technology and through these advancements have influenced technological development in other related industries, notably not as manufacturers of munitions (cf. Samuels, 1994). A very rough outline of major technological contributions to the photography industry from 1925 follows.[18]

The first 35 mm camera to be widely accepted was the Leica 1 (Model A).[19] It was developed as a prototype by Oskar Barnack in 1924 and introduced a year later by Ernst Leitz at the Leipzig Fair (Morgan and Lester, 1953, pp. 5-6). The camera was a success because it used 35 mm cine film which was in plentiful supply, because the new cinematographic film industry (dependent on 35 mm film, or the 24 x 36 mm format) was booming. Following the Leica design, Canon (then Seiki Kogaku Kenshusho or Precision Optical Instruments Laboratory) produced its first prototype 35 mm camera, the Kwanon, for the Japanese market in 1935 (Canon, 1994, pp. 4-5). Despite

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[18] Detailed sources of Japanese firm's contributions to the photography industry include Condax, *et al* (1984); JCIA (1971, 1987 and 1994); JCII Camera Museum (1989); Lewis, ed. (1991).

[19] There were at least 27 cameras for 35 mm still photography before April 1925, when the Leica was introduced (Naylor, 1980).

the fact that the modern Japanese photography industry had taken off by the mid-1930s, the most expansive growth did not occur until after 1945.[20]

According to the editors of *Camerart* (1990), a Japanese periodical for the photography industry, the main technological contributions of Japanese companies to the industry came after a period of copying which lasted until about 1960. Most of the early technology came from the German firms Ernst Leitz and Zeiss Ikon (maker of the Contax camera) which led in rangefinder camera technology.[21] Rangefinder cameras have two lenses, one through which the photographer sees the subject to be photographed and one through which the camera exposes the film to light when the shutter is opened. The lenses are placed in the camera to limit the amount of distortion between what the eye sees and what is actually photographed. Nonetheless, there is still some discrepancy between what you see and what you get.

The Rolleiflex, a camera made by Franke and Heidecke of Germany, was a popular twin lens reflex camera of 1928. On a twin lens reflex, the lenses are placed vertically on the camera, one directly above the other, and unlike the rangefinder which is held up to the eye, the twin lens reflex is held at waist height. The top lens is used for focusing as the photographer looks down through a hood onto a ground glass focusing screen. The lower lens is used for exposing the object to be photographed to the film when the shutter is opened. Like the rangefinder camera, what you see is not the same as what you get. The Rolleiflex used a highly-sophisticated Compur shutter which proved very difficult to imitate. Nonetheless, twin lens reflex cameras were very popular in Japan, especially in the 1950s (very few were exported), but demand for them dwindled as other more advanced cameras came on the market.[22]

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[20] The Japan Camera and Optical Instruments Inspection and Testing Institute (1984, pp. 25-26) goes so far as to say that the industry's take off was a postwar phenomenon.

[21] The term rangefinder camera means that there is a rangefinder coupled to the focusing mechanism (Naylor, 1980).

[22] The most popular model according to the editors of *Camerart* (February 1990) was the Ricohflex III of 1950. All camera manufacturers, most notably Mamiya and Yashica, made twin lens reflexes except Nikon, Canon and Asahi Optical/Pentax.

The most important innovations to cameras by Japanese companies came with the single-lens reflex (SLR) camera. The earliest SLR equipped with a pentaprism was the Contax S of 1949 produced by the East German firm Zeiss Ikon. The pentaprism allows for eye-level viewing, like the rangefinder camera. With an SLR, the photographer looks through the same lens that the camera uses to expose the film to the image being photographed. Thus, unlike the rangefinder and the twin lens reflex, there is no distortion between what you see and what you get. The problem that made the SLR system less popular than the rangefinder system was with the mechanism that moved inside the camera to open the shutter and expose the film to the image. While this happened, the photographer lost sight of the image. After the photograph was taken, the mechanism had to be moved back manually, so the photographer could once again see the photographed image. The photographer had to remember to re-set the mirror to see the image, and this detracted from the popularity of the SLR system.

The problem was solved when Asahi Optical/Pentax pioneered the instant-return mirror for the SLR in their Asahiflex IIB announced in 1954. The mirror moved only when the shutter opened and then returned to the viewing position after the shutter had been released. Now, you really did see what you would get. Asahi Optical introduced its first Pentax brand camera (the Asahi Pentax) in 1957. It was the first SLR with both a pentaprism finder and the instant-return mirror. In 1959, Nikon introduced its own first SLR camera, the legendary Nikon F, with nearly the exact mirror system as the Asahiflex IIB, and with an interchangeable pentaprism-hood finder system, and a stainless steel mount.[23]

Also in 1959, Olympus introduced the Olympus Pen, a half-frame camera which took the Japanese market by storm. Half-frame means that that the camera used only half (18 x 24 mm frame) of a standard 35 mm negative

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[23] Asahi Optical claimed patent infringement by Nikon in August of that year, and according to the editors of *Camerart* (March 1990, p. 38), the dispute was not concluded until March 1961 and only with the help of mediators from the industry and MITI.

and could therefore take twice as many photographs with the same amount of film. The standard, (24 x 36 mm frame) 35 mm camera used two 'full' cine frames to make one photograph. The half-frame camera is in fact a misnomer since it employed one frame while standard 35 mm cameras employed double frames. In Japan (and in many other countries), the price of photographic film made picture taking an expensive profession or hobby. Thus, the half-frame camera was a major contribution to expanding the market for cameras but not so much for film.

The 1960s was a period of 'development' for the camera makers, according to the *Camerart* (1990) editors. The editors of *Amateur Photography* (1960) agreed; the general trend was 'automatic.' Copal, a shutter maker, developed the first modularized metal-bladed shutter the Copal Square in 1960 which became one of the most popular shutters ever. The Canonet, introduced the same year by Canon, was a small, affordable camera with a very fast (from 1 to 1/500 seconds) between-the-lens shutter. There are two types of shutter mechanisms in rangefinder cameras, the focal plane (FP) type, of which the Leica is the most noted example, and the lens shutter (LS) type. The latter type was very inexpensive to produce and gave Japanese camera manufacturers a name for cheap goods (*Camerart*, April 1990). SLR cameras were more complex and therefore higher cost cameras than the LS cameras; they earned more foreign exchange as exports.

The next Japanese innovations came in automatic exposure (AE) control with the first in 1960 being the Olympus Auto Eye, a 35 mm LS camera. Automatic exposure meant that the camera contained a light meter or sensor which could determine how much light would reach the film. This was an improvement because even with the SLR system, the human eye cannot see how much light will hit the film loaded inside the camera in order to determine the exposure of the image. The first SLR with a built-in metering system was Tokyo Optical's Topcon RE Super of 1963 which had a through-the-lens (TTL) exposure meter. Konica introduced the first AE SLR, the

Autorex, two years later, but it was not a TTL system. Asahi Optical's Pentax ES (electronic shutter) introduced in 1971 solved that problem using a focal-plane shutter. The first camera with a metering system that read how much light fell on the film surface was the Olympus OM-2 of 1974.

The Japanese government and the industry associations encouraged the development of automatic light metering systems to advance the state of Japanese camera/lens technology (see chapter three). Much of the research into AE systems in the 1950s was undertaken through joint research organized by the Japan Camera Industry Association (JCIA). Light metering systems continued to be developed independently by firms and in later years firm-based R&D became the norm for technological advancements in cameras/lenses (see chapter five). Minolta and Nikon, in particular developed a variety of systems and exposure meters from the research originally begun through the JCIA. The first camera to apply the matrix metering system was the Nikon FA of 1983. Matrix metering means that the viewing screen of an SLR is broken into a matrix from which a more exact measurement of light exposure can be made.

The electronic controls that went into the inventive metering systems set the stage for the next stage of automation using integrated circuit (IC) chips. The Pentax ES II (Asahi Optical) of 1973 was the first camera to use "a single board mounted with three IC chips and only a few discrete components...plugged into a socket that was fixed to the inside bottom of the camera chassis" (*Camerart*, May 1990, p. 30). The year before, Polaroid had introduced the SX-70 which employed integrated injection logic (IIL) chips which could handle both analog and digital signals.[24] Innovation in production processes from that point onward became an important factor in achieving economies of scale in camera production since firms would have to mass purchase ICs if they were to advance the automation trend already underway. The Canon AE-1 introduced in 1976 revolutionized the industry; it

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[24] The IIL chips were developed jointly with Texas Instruments (*Camerart*, May 1990).

was the first IC camera and it could be produced at a very low cost (see chapter five). The firms that engaged in competition now were those that do not count cameras as their main line of business, e.g. Canon, Konica, Minolta and Ricoh. Competition among the market leaders took a new dimension in the mid-1980s in autofocus SLRs with Minolta's Alpha-7000 and its competitor Canon's EOS system.[25]

In 1981, Sony, not one of the traditional camera makers, introduced the Mavica, a still video camera that employed a charge-coupled device (CCD), i.e. a light sensor that creates the digital images.[26] The problem with early digital images was their poor picture quality as prints. In the early 1990s, Casio, Sanyo, Canon and a few others came out with digital still cameras with improved image quality, but they are not suited to professional use. To fill that niche, Nikon markets cameras that work with Kodak digital backs, and Olympus recently introduced a more advanced, high-end digital camera. Digital images are limited to a fixed number of pixels (i.e. squares of digital information). The more data (i.e. detail) in a digital image, the more computer memory is required. Digital images are becoming increasingly practical for marketing, e.g. catalogues and brochures, and the picture quality rivals traditional silver-halide photographs as long as they are small. Once a digital image is blown up, the definition is lost, because the pixels are easily detected by the human eye.

A brief history of the pre-1945 developments in photographic film manufacturing is given in chapter three. Here, the most important postwar contributions of Japanese firms in photographic film are presented. Photographic film is a high-level fine chemical industry with very high barriers to entry for new firms (Haruki, 1959). According to Sakae Haruki

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[25] In 1985, Minolta introduced its new camera simultaneously in Japan, the US and Europe as Alpha 7000 (Japan), Maxxum (US) and Minolta 7000 AF (Europe) (Lewis, 1991, p. 178).

[26] Japanese firms were very active in developing cine cameras, especially during the 1960s. Cine cameras used a variety of different films including 8 mm and 16 mm, but they were overtaken in the 1980s by the introduction of video cameras developed by among others Sony. The cine and video camera story, while important, does not contribute significantly to the story told in this thesis.

(1959), president of Fuji Photo Film and of the PSMA in 1959, the industry requires extensive raw materials, continuous injections of capital for research and development and investment in high-volume, comprehensive manufacturing facilities. The key to success in photographic film manufacturing is to be able to manage the complex manufacturing techniques to produce reliable photographic film consistently (cf. Jenkins, 1975). Because the barriers to entry for new firms are so high, there are only a few photographic film makers in the world, and the manufacturers tend to hold oligopolistic positions in their home markets.

Photographic film is composed of a base film coated with a photosensitive silver-halide emulsion.[27] Each major manufacturer has its own emulsion formulae which differentiates their products from one another. Many firms (e.g. Konica and Fuji Photo Film in Japan, DuPont, Kodak and 3M in the US, Agfa in Germany and Ferrania in Italy which was acquired by 3M in 1964) manufacture base film since it has numerous industrial uses other than photographic film (cf. Kobayashi, 1970). There are two types of photographic film, negative and positive (or reversal) film. Negative film used in still cameras is developed and generally printed on paper. Positive movie film is projected onto movie theater screens, and can be used in still cameras to make slides.

Economic stability is a necessary condition for photographic film manufacturing which is a complex, fine chemical industry to grow and prosper (Haruki, 1959). Because Japan's chemical industry lagged behind world leaders, the technological level of photographic film remained comparatively low. Prior to WWII, photographic film was targeted as an industry that Japan should develop so as not to be dependent on overseas suppliers (Fuji Photo Film, 1984, pp. 12-13, 16-17). This is the background to the establishment of Fuji Photo Film. Konica, established in 1873 as a pharmaceutical store, began to sell imported photographic goods in 1876 and

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[27]Information based on interviews with industrialists, Spring 1996.

from 1903 began to manufacture cameras, lenses and film (Lewis, 1991, pp. 4, 17). After WWII, the industry was protected by import quotas, restrictions and tariffs until the early 1970s (cf. Itoh and Kiyono, 1988). Although photographic film was targeted for export (cf. Seki *et al*, 1961), the industry recovered relatively slowly throughout the 1950s and 1960s.

Only four Japanese firms manufactured of photographic film and paper in Japan in 1959 (Haruki, 1959). Fuji Photo Film and Konica manufactured film, photosensitized paper and dry plates. Photosensitized paper was also manufactured by Mitsubishi Paper and Oriental, and Oriental manufactured certain types of film until the late 1950s. As noted in chapter three, Konica introduced its first black and white photographic film in 1929 and the first Japanese color film in 1940. Fuji Photo Film followed with black and white film in 1936, and introduced their first natural color film in 1948. Konica re-introduced their Sakura natural color film the same year (Lewis, 1991, pp. 38, 52, 64-65).

As noted above, demand for photographic film far exceeds the demand for cameras and/or lenses. Throughout most of the postwar period, the majority of innovations in photographic film formats have come from the US. Kodak periodically developed new film systems (e.g. the smaller than 35 mm 110 cartridge, 126 cartridge and disc formats) to inject new cash flows into the firm (see chapter three). Polaroid was founded by Edwin Land, a highly inventive scientist who developed, among others, the Polaroid Land cameras which printed black and white (1948) and color (1963) photographs immediately, and the 1972 SX-70 instant photography system.

Unlike their US competitors, the two Japanese film makers Konica and Fuji Photo Film concentrated their efforts on the 35 mm format. Given the popularity of 35 mm photography in Japan, this is hardly surprising. The postwar industry was led by Kodak, but Fuji Photo Film successfully introduced new, faster film in both black and white and color during the 1980s. Konica which had traditionally led in photographic film making had

fallen behind Fuji by the 1970s. Fuji, in addition to launching fast films (with ISO speeds of 400, 800 and 1000) during the 1980s, developed the 'throw-away' (or the more environmentally-friendly 'one-time use') camera launched in 1986. It is essentially a box of film with a very small plastic lens and often a flash attached.[28] After all the film has been exposed, the photographer takes the whole camera to be developed. The film is naturally used, but the plastic parts are recycled into 'new' one-time use cameras. All the market leaders in film now offer their own one-time use cameras.

One of the main reasons that the Japanese camera/lens and film companies have been so successful since 1950 is their active engagement in technological development. The early postwar years were a time of catch-up for the firms, and the Japanese government encouraged the firms (mainly through the industry associations) to raise their technological levels so their exports would earn foreign exchange through sales in the US and Europe. One of the best ways to combat the image of shoddy Japanese goods which was so prevalent in the 1950s and 1960s was to raise the technological level of camera/lens (and later film) exports (see chapters four and five). In the 1970s and 1980s, photography firms conducted their R&D in house because competition for market shares had grown. One way to increase market share was to launch new, revolutionary products, such as the Canon AE-1, the Minolta Alpha-7000, and the Fuji throw-away cameras, and to support them with marketing. The leading Japanese photography firms utilized technology to expand their product lines and to apply innovations to older products. This is what allowed them to stay competitive throughout the postwar period.

Methodology

There is no standard methodology for analyzing industrial sectors, national or global, or for researching a thesis in this neglected field. Literature on Japanese

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[28] In Japan, these cameras are literally called 'film with lens attached' (*renzu tsuke fuirumu*).

industrial policy, industrial organization, business and international political economy is used to highlight what is missing from most sectoral analyses (see chapter two). Additional detailed case studies on specific sectors in Japan are needed if we are to develop a more thorough understanding of industrial policy in Japan and of Japanese economic development in general. The case presented in this thesis is not, it should be stressed, a business school type case study. It is a detailed analysis of the evolution of a whole industry and as such is highly dependent on the available historical materials and recollections of those who were interviewed.

As discussed above, the photography industry in Japan has largely been ignored in terms of government-industry relations for many reasons. The lack of literature on the technological and industrial development of the industry made it a perfect case study of international political economy. State and market variables mattered greatly, both nationally and internationally. Questions that arose immediately were: why are there so many Japanese companies leading the industry on a global scale, and how has the industry so long avoided a bilateral trade dispute with the US? Because there are few US competitors in this industry, it became clear that this case would require a multilateral, indeed global, analysis rather than a bilateral US-Japan analysis, the latter of which is so pervasive in US studies of Japan's government-industry relationship (e.g. Encarnation, 1992; Gerlach, 1992; Mason, 1992; Okimoto, *et al*, 1984; Prestowitz, 1988; Tyson, 1992; and Vogel, 1985).

The Japanese photography industry is composed of many firms which produce many products. Statistically speaking, their products have been variously classified in Japanese government publications as precision machinery (or sometimes simply as machinery), as optical equipment, as sensitized materials (or sometimes simply as chemicals), or as photographic film and photographic paper. The thesis is limited to firms which began as photography firms, in either sensitized materials (photographic film and paper) or optics (photographic lenses) and cameras and are today the market

leaders. The failed companies are also worthy of study, but for practical reasons it was necessary to highlight the (many) successful Japanese photography firms in order to say something meaningful about the evolution of the industry.

An important aspect of this thesis was to develop an understanding of conditions in the countries which were Japan's main competitors (i.e. the US and Europe) over the postwar period. Taking a long view of history, that is, learning how the industry developed from its earliest beginnings (from the *camera obscura*) to the present was helpful for understanding more recent history. To tease out the government-industry relationship in Japan, postwar economic development, international economic relations and international political relations were taken into consideration. Finally, it was necessary to learn about technological change in the photography industry relative to overall technological change in Japan, the US and Europe.

This thesis takes an eclectic approach, that is, it considers literature on industrial policy, industrial organization and political economy to see what can best explain what happened in the Japanese photography industry over time (cf. Strange, 1994, pp. 10-12). Unfortunately, much of the literature is very general and it was often impossible to find references to specific industries, much less to the photography industry. In the end, no single, comprehensive theoretical explanation can completely satisfy all aspects of the industry's evolution. Dynamic change over the postwar period made this impossible. As a compromise, applicable aspects of the available literature were combined to help formulate and analyze the postwar evolution of the Japanese photography industry (cf. Dunning, 1993).

Much of the literature on industrial policy suffers from focusing solely on economic and/or political issues, downplaying such factors as security, technological change, and knowledge creation and transmission. Analyses driven by political science theory, for example, place strong emphasis on the role of the state and elite bureaucrats in Japan (cf. Johnson, 1982; van

Wolferen, 1990). In contrast, economists often interpret industrial policy as a response to 'market failure' and concentrate on explaining how Japan's postwar economic 'miracle' can be understood through conventional economic theory (cf. Komiya, 1988; Trezise, 1976). A few have stressed the role of firms in Japan's postwar economy and predictably found that both bureaucrats and politicians were less important than the firms themselves (cf. Callon, 1995). None of these approaches is satisfactory because they stress one variable over another rather than analyzing how the relative importance of many variables change over time. The study of market-state behavior, for example, is not complete without the analysis of firms and firm behavior (cf. Stopford and Strange, 1991). Furthermore, this thesis shows how important technological change is to a nation's economic development and that it must never be ignored in dynamic analyses (Lazonick, 1991; Vestal, 1993). Unfortunately, too many studies take an insufficiently long view of history and end up ignoring the fact that government policy, the relative power of the state and the firms, and general economic conditions change over time (cf. Strange, 1996).

The longer our view of history, the more difficult it becomes to draw sweeping generalizations. And although generalizations are needed in social science research, they should not be so broad as to obscure important details. While there may be similarities across certain industries, for example, it is virtually impossible to generalize across all industries. It is likewise impossible to generalize about the behavior of all firms within one industry. This is an important theoretical challenge to a much of the current literature in management and industrial organization (cf. Aoki, 1990; Williamson, 1985). In the early postwar years, the industries in Japan, the US and Europe differed and were influenced by local preferences. By the end of the period studied (i.e. 1995), this had completely changed. Mass production, mass marketing and convergence of consumer preferences had made the industry a global one. These finding contrast sharply with some recent scholarship which suggests

that nationality is the dominant variable of firm behavior in the global economy today (cf. Pauly and Reich, 1997; Porter, 1990).

The methodology adopted in this thesis amounts to telling a story about how the photography industry developed in Japan. The industry's evolution and the respective roles of key players is best considered by a straightforward historical account and judicious use of qualitative data. While this story cannot be told without quantitative references, it is not dependent on game theory or regression analysis which would only obscure the messages this story holds. Stories are subject to interpretation. One of the challenges of this project has been to decide exactly which of the many messages the story of the photography industry contains, that is, which are most important and which are most relevant to the study of international political economy. Firms are important, particularly how they have alternately worked with and against government policies, with and against each other and how they worked to shape policies specifically directed toward them.

Therefore, while MITI and other government ministries played a pivotal role in formulating and carrying out Japan's postwar economic policies, they did not do it alone. Firms played a very important role in both policy formulation and execution. As Encarnation and Mason (1990) and Mason (1992) have shown firms have played an active role in the policymaking process in Japan. Contrary to prevailing beliefs, Jerome Cohen (1949, p. 60, note 26) suggests that historically "[it] was quite customary in Japan for...a de facto situation to exist well in advance of legalization" by the government. The facts as presented in this thesis lend support to Cohen's findings, that policy often followed what was already occurring in the economy, and that the job of policymakers was to try and control events through measures some of which helped but some of which actually hindered the expansion of the photography industry.

Rivalry and Cooperation

The words 'rivalry' and 'cooperation' were chosen for the title of this thesis because they most aptly describe the government-industry relationships in the photography industry. These were: (1) rivalry as well as cooperation among government officials (particularly between bureaucrats and politicians but also among bureaucrats); (2) rivalry and cooperation between the government (mainly bureaucrats) and the industry; and (3) rivalry and cooperation among the photography firms. What is notable is that while the degree of rivalry and cooperation changed over the postwar period, it appears that there was more 'cooperation' during the period of economic recovery and more 'rivalry' during the period after the first oil crisis (roughly after 1974).

The terms cooperation and rivalry are not new in the vast literature on Japan's postwar economic 'miracle.' Scott Callon (1995) identified the 'cooperative-functional' thesis in which he includes the 'revisionist' interpretation of Japan's industrial policy (cf. Johnson, 1982; Prestowitz, 1988; and van Wolferen, 1990). Most of the literature on Japan's joint government-industry high-tech research consortia (e.g. Anchordoguy, 1989; Fransman, 1990; and Sigurdson, 1986) typifies this school of thought, according to Callon. It is 'cooperative' because of the collaborative nature of the government-industry research consortia in carrying out its goals and 'functionalist' because many scholars see it as a model that could be used by other advanced economies.

In *Head to Head,* Lester Thurow (1992) referred to "competition and cooperation" as a strategy that nations might successfully pursue in the future. Laura D'Andrea Tyson and John Zysman (1989, pp. 70-71) discussed Japan's neomercantilist practices, referring to 'controlled competition' (as used by Yasusuke Murakami (1982) and later by Martin Fransman (1995)) which they defined as "cooperation amid competition." Chalmers Johnson (1989) and Clyde Prestowitz (1988), among others, have described the in-fighting, i.e. the

rivalry, between the Ministry of Posts and Telecommunications (MPT) and MITI in decisions over Japan's high-technology policy particularly when telecommunications firms were involved. Recent literature on foreign direct investment and the changing role of multinationals in the global system (e.g. Encarnation, 1992; and Stopford and Strange, 1991) have played on the word 'rival' to describe firm-firm, state-state as well as state-firm competition.

In the Japanese photography industry, there was a subtle but real shift from more cooperative government-industry relationships before the early 1970s to less cooperative relationships after that time. Pinpointing exactly when the shift occurred is impossible, but the tendency was toward rivalry after the early 1970s, when the international trading system set up after WWII was also undergoing change. Each of the three relationships identified above, i.e. bureaucrat-politician, government-industry and firm-firm, is characterized by both cooperation *and* rivalry throughout the postwar period.[29] Both cooperation and rivalry always existed, but they were rarely in balance; one often took precedence over the other.

First, the bureaucrat-politician relationship was generally more cooperative in the early recovery years, but this cooperation was harder to achieve as consensus over Japan's national goals began to break down. The early years were, however, not free from discord. This is particularly obvious in the case of the establishment of the inspection institute for cameras and lenses. An LDP politician, Kinji Moriyama, worked to found the institute which, as it turned out, became central to raising product quality standards and promoting the industry overseas (see chapters three and four). While the relationship was mostly cooperative until the early 1970s, politicians and bureaucrats also behaved as rivals. Generally, however, before the 1970s, politicians tended to let the bureaucrats handle industrial policy.

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[29] By politicians, I refer to the members of the Liberal Democratic Party who almost without exception ruled Japan from 1955, when the party was formed, until 1991.

Beginning in the 1970s and continuing into the 1980s, Japanese bureaucrats faced increased criticism at home for putting firms before people (e.g. pollution problems and poor living conditions) and abroad for Japan's industrial policy (e.g. the protected domestic market and large export surpluses). This translated into disagreement on national economic goals. Pressure for change came from the United States through a string of bi-lateral trade disputes (cf. Prestowitz, 1988). This finally affected the photographic film makers — in particular Fuji Photo Film — when they were charged in 1995 with unfair trading practices (Dewey Ballantine, 1995a and 1995b). While it is not clear that bureaucrats and politicians have been rivals in recent years over issues affecting the photography industry, their relationship does appear to have been less cooperative than in the early recovery years (see chapter five).

Second, the government-industry relationship was cooperative in the early recovery years when both sides strove after the common goal of economic growth. Firms were constrained at first by the heavy bureaucratic controls placed on their activities, from international trade to bank financing. However, as these controls relaxed and the economy was well on its way to prosperity, industry and government cooperated less easily. It should be stressed that all firms were not equally as aggressive in de-linking themselves from government policies, but instead found it useful to cooperate with government arrangements when they were perceived to be beneficial.

Finally, the firm-firm relationship was plainly one of cooperation among exporters in the early recovery years. Exporters complied with a government scheme to set up camera repair centers in New York and Okinawa that allowed their competitors — as well as their own employees — to repair and spread information about all Japanese cameras. This is a clear example of firm-firm cooperation and government-industry cooperation. The camera/lens exporters never would have joined such a plan if they had not realized that their best road to success was through cooperation. Of course

they were rivals, especially in the domestic market, but they chose to cooperate closely for a short time for the benefit of all (see chapter four). Rivalry among the firms became more and more pronounced over time, especially after the 1970s when Japanese photographic firms competed for market shares in the largest markets in the US and Europe. With no other real competition left in cameras/lenses, rivalry among the Japanese firms in those products intensified on a global scale (see chapter five).

Because the photography industry is composed of many firms whose behavior varied throughout the period studied in this thesis, it is impossible to conclude that all firms cooperated (or were rivals) at any one particular time. The same goes for the Japanese government. It is impossible to draw vast generalizations about all the firms or all parts of the government. It is possible to say, however, that cooperation and rivalry describe the government-industry relationships over time and that the level of cooperation decreased (while the degree of rivalry increased) as the economy — and the firms within it — grew and prospered.

2. Literature Review

Introduction

Why has the photography industry been so generally ignored? One reason is to be found in the literature concerning Japan's government-industry relations over the postwar years. This literature has generated some powerful myths about the reason for Japan's postwar economic success. For instance, it is commonly believed that the photography industry was not on the receiving end of beneficial government policies, i.e. industrial policies, unlike certain strategic industries, e.g. steel, automobiles, electronics, petrochemicals, computers and semiconductors. Evidence from the photography industry flies in the face of this myth. We cannot advance our understanding of Japan's government-industry relationship through analyses of the strategic industries alone. All industries are not the same and they did not develop in the same manner over the postwar period. Therefore, we need evidence from all industries — including consumer goods industries — to develop a clearer picture of Japan's government-industry relationship over the postwar period.

Industrial policy is the most commonly analyzed aspect of Japan's government-industry relationship. As it has been applied to Japan, industrial policy centers on the relationship of the Japanese government (mainly the bureaucratic elite in the Ministry of International Trade and Industry (MITI) and the Ministry of Finance (MoF)) to Japanese industries (mainly the so-called strategic industries). The obvious drawback of this approach is that it runs the risk of depending on highly generalized accounts of states and markets (i.e. bureaucrats, politicians, industries and firms). As a consequence, several popular myths have developed and generally have gone unquestioned.

One goes like this: an 'omniscient' bureaucracy skillfully guided Japan's economic development, but that in recent years their ability to divine the future course of the Japanese economy has foundered due to the fact that Japan has 'caught up' technologically with the 'West' (cf. van Wolferen, 1990). Another says that the Japanese economy developed successfully because of classical market forces and the existence of a large, intensely competitive domestic market which allowed firms to hone skills that were then successfully employed overseas to gain impressive market shares (cf. Eads and Yamamura, 1987; Komiya, 1988). Other myths have emerged that are elaborations upon or combinations of these two (cf. Spero, 1990).

A purpose of this thesis is to dispel a number of mysteries that shroud our understanding of how Japan's economy works and how the economy recovered so quickly after the second world war. This is done via the photography industry. International political economy, it is argued, offers a higher level of explanatory power because it forces us to account for factors that might be excluded by doctrinal interpretations, e.g. the roles of 'the state' in political theory and 'the market' in economic theory. The historical context is critical, although too often it is dismissed through reliance on generalization rather than on solid, empirical evidence. This premise is the core around which the story of the photography industry is told.

The topics discussed in this chapter are: the basic discourse on Japan's industrial policies; what (little) has been said about industrial policy and the photography industry; why industrial policy explanations are inadequate for the analysis of Japan's economic growth and prosperity during the postwar period; and how international political economy is a more effective and powerful tool to analyze complex, empirical studies such as the postwar evolution of the photography industry in Japan. As in chapter one, it was argued that the photography industry was one of Japan's backbone recovery industries (i.e. cameras/lenses, sewing machines, clocks/watches and bicycles) which, during the early postwar period, was supported by both the US and

Japanese governments and firms. This argument is at odds with conventional explanations which claim that in Japan, industries driven by domestic demand needed no extra help from the bureaucracy, i.e. they did not benefit from industrial policy. Deciding whether an industry or specific firms benefited (or not) from industrial policy largely depends on how the terms are defined. Therefore, what is meant by the term industrial policy and how it has been applied (or not applied) to the photography industry is discussed next.

Industrial policy in Japan

The term 'industrial policy' did not come into common use in Japan until the early 1970s, but it is probably the most frequently used tool of analysis of government-industry relations in Japan (Komiya, 1988 and 1990; Okuno-Fujiwara, 1991; Suzumura and Okuno, 1986).[1] Industrial policy is not unique to Japan. According to Ira Magaziner and Thomas Hout (1980), industrial policy cannot be discussed without taking economic and noneconomic factors into account or without acknowledging that there is considerable variability among industries. They give a simple definition of industrial policy saying (p. 1):

> It is our view that industrial policy --which is defined here as the application of government resources and influence to industrial affairs -- cannot be properly studied or prescribed without a thorough understanding of how competition varies by industry and how the economics of businesses change over time. Industrial policy must be informed by more than national priorities and where the fast growth markets are. Industrial policy is an integral part of the international competitive business system and must be highly responsive to it.

The debate over industrial policy is not confined to the study of Japan's government-industry relationship. The truth is that every country — including the US — has an industrial policy. To some extent, the denial or

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[1] Somewhat jokingly, some have said industrial policy is simply 'what MITI does' (cf. Suzumura and Okuno, 1986, pp. 2-3).

acknowledgment of the existence of industrial policy (in Japan or elsewhere) depends on the doctrine to which a particular pundit subscribes.

Scholars who heartily recognize the existence of industrial policy in Japan analyze it from a state-centered perspective, arguing that it is an integral part of Japan's 'developmental state' (e.g. Fallows, 1989; Johnson, 1982 and 1995; Prestowitz, 1988; and van Wolferen, 1990). This 'revisionist' view on industrial policy in which a highly-educated bureaucratic elite (in the MoF and MITI) guided Japan's economic 'miracle' through effective planning and politics has been put forward most forcefully by Chalmers Johnson in his *MITI and the Japanese Miracle* (1982) and more recently in his collection of essays on the 'developmental state' entitled *Japan: Who Governs?* (1995).[2] The importance he attributes to the bureaucracy and the state is quite close to the realist view in political theory, represented by Alexander Hamilton and Friedrich List who believed that state intervention and trade protection were crucial for latecomers to the process of industrialization (cf. Strange, 1994, pp. 180-181).

Liberal economists — if they recognize the existence of industrial policy at all — often view it as an inefficient response to 'market failure,' i.e. problems in resource allocation due to the ineffectiveness of the market mechanism (e.g. Eads and Yamamura, 1987; Komiya, 1988; and Trezise, 1976). Yet there is little agreement among economists on what are appropriate responses by government to situations of market failure. The view that Japan's bureaucracy was in any way responsible for planning the resurgence of the economy after WWII, is generally eschewed. As early as 1976, Phillip Trezise wrote (pp. 756-757):

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[2] Johnson's lead has been followed by, among others, van Wolferen, Prestowitz and Fallows who are considered to be the main writers of 'the revisionist school.' They are called revisionists because they stressed the importance of the bureaucracy rather than neoclassical economics as a factor in Japan's postwar economic 'miracle.' Until that time, Japan's economic performance had largely been interpreted through economic theory. Managed trade became the buzz word of the late 1980s and early 1990s for how the US could counter Japan's effective bureaucratic leadership (i.e. industrial policy). Specific government policies directed at promoting American businesses, rather than simply promoting free trade and a capitalist spirit, should be pursued, they said, and the traditional animosity between government and business (i.e. not on the military side) would be dampened (cf. Tyson and Zysman, 1989).

> There is no question ... that, as in all modern states, the political environment and the economic policies that were among its products have influenced economic events pervasively and in some respects crucially. To suppose, however, that politicians and officials in league with businessmen were able to plan and guide Japan's explosive economic growth *in detail* is neither credible in the abstract nor ... supported by the realities.

Trezise's words represent an extreme statement — but not an unusual one — of the liberal position. Thus, economists tend to see industrial policy as economic policy formulated as a response to market failure, whereas revisionists give all the credit to Japan's powerful bureaucrats. Both viewpoints are heavily biased by their ideologies.

A number of scholars, who are often called 'pluralists' (e.g. Aoki, *et al*, 1996; Calder, 1993; Okimoto, 1989; and Vestal, 1993), place the discussion somewhere in between these ideological extremes, i.e. the fuzzy middle ground somewhere between the revisionists and the liberal economists. But they tend to stick to the idea that it is a bureaucrat-industry discourse, overlooking other important factors such as firms, technology and information flows. Daniel Okimoto (1989, p. 1), for example, notes in Japan that "[a]lthough capitalism is considered the best economic system yet devised, its imperfections are clearly understood." In his interpretation, bureaucrats in Japan recognize that the invisible hand of the market (i.e. industry) *at times* needs the visible hand of government (i.e. the bureaucracy) to keep things on the right track. Takafusa Nakamura (1981) called this form of government intervention "shelter from the storm."[3]

Many scholars recognize the importance of sectoral analysis for informing the debate on Japan's industrial policy. Moreover, analyzing Japan's economic success in terms of the role of the firm has grown in popularity (e.g. Abé, 1997; Aoki, 1990; Aoki and Dore, 1994; Callon, 1995; Dore, 1986; Fruin,

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[3] Itoh, *et al* (1988a, p. 249) describe this view as opposite to Ryutaro Komiya's interpretation of industrial policy (presented in the same volume) in their discussion of the formation of cartels and the existence of so-called 'excess competition.' This is elaborated upon below.

1992; and Magaziner and Hout, 1980). However, with few exceptions, the debate still tends to be very general drawing conclusions about all firms or industries. Many studies focus on one or more industries, but they seldom analyze a large number of firms within the industries and most are preoccupied with the industries' relationships with specific bureaucracies.

Furthermore, only a few scholars (e.g. Mason, 1992; and Encarnation and Mason, 1990) have concerned themselves with the impact of multinational corporations (MNCs) on Japan's government-industry relationship and policymaking process. As Stopford and Strange (1991) and more recently Strange (1996) have shown, MNCs and other non-state actors have changed the terms of global competition by taking an active role in national, regional and international policymaking, especially when policy has the potential to affect them financially or to affect their relative power. Japan's export-oriented consumer goods industries are particularly good examples of the growth of Japan's MNCs on the world stage. However, they have attracted very little scholarly attention (except for the electronics industry, although it is debatable if the industry is in fact a consumer goods industry) and the emphasis there has been steered by the traditional preoccupation with industrial policy.

A great deal of attention has instead gone into the study of the so-called 'strategic' industries (e.g. steel, shipbuilding, petrochemicals, automobiles, semiconductors and computers) and it is the evidence from these studies which has informed the theoretical discussion of industrial policy in Japan.[4] Unfortunately, empirical data on most other Japanese industries is lacking, especially in English. This has prompted leading scholars to call for in-depth case study analyses from which it is hoped lessons could be drawn for other countries and contributions to developing the debate over the role of -- and the importance of -- industrial policy in Japan's postwar economic history could be

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[4] These industries are called strategic because they are seen as the basic industries needed by all modern, advanced industrial economies.

made (cf. Yonekura, 1996).[5]

There are three points that should be stressed regarding the broader interpretations of industrial policy, such as the one given above by Magaziner and Hout (1980). First, it is generally agreed among scholars that in Japan industrial policy's heyday was prior to the early 1970s.[6] However, many studies ignore the dynamic of change over time and therefore offer little or no perspective of how industrial policies in, for example, 1960 *differ* from industrial policies in the 1980s. James Vestal (1993, p. 2) notes:

> Industrial policy advocates and critics rarely differentiate between industrial policy in Japan's early stages of development and industrial policy after Japan had achieved advanced nation status. [...] Equally important, this lack of differentiation fails to acknowledge the differing degrees of intervention that have characterized Japanese industrial policy over time.

The consensus needed for making effective industrial policy began to break down in the early 1970s, and the tools to carry it out became more limited over time as Japan's successful economy came into the international, and especially the American, spotlight.[7] Before the 1970s, much of Japan's industrial policy was focused on promoting exports and protecting the domestic market from imports which might prevent industries from recovering to prewar levels of

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[5] Takatoshi Ito stated at a 1996 conference on market-state relations that the most important thing that remains to be done on this subject is to produce more empirical evidence through case study analyses of those industries which have yet to be studied. Only in this way can the theoretical discussion of market-state relations in Japan move forward. Author's notes, 'Market and Government: Friends or Foes?, An International Conference on the World Economy,' sponsored by the Institute of Economic Research, Hitotsubashi University, Tokyo, February 1996.

[6] There were many external shocks to the Japanese economy in the early 1970s, among them the 1973-74 oil crisis, Nixon's 1971 visit to the People's Republic of China (without prior consultation with Tokyo), the levying of a 10 percent surcharge on imports into the US, and the first postwar revaluation of the yen in 1971 (float began in 1973). The last was especially important for Japan's export industries. At roughly this same time, the public dissatisfaction grew over the degradation of the environment and poor quality of life due which many thought had been compromised for the benefit of industry. General dissatisfaction with Liberal Democratic Party corporatist policies allowed the opposition parties to use Japan's environmental problems to their advantage. The general mood of the early 1970s also prompted the restructuring of MITI in July 1973. See, among others, Johnson, 1982; Lincoln, 1988; Nakamura, 1981; and Tsuru, 1996.

[7] As Tyson and Zysman (1989, p. 59) put it, "In the late 1970s, America discovered Japan."

output and beyond. Capital flows were controlled by bureaucratic initiative and much of the financing to make recovery possible came from government (mostly long-term lending) and commercial (mainly short-term lending) banks. Foreign direct investment was difficult to arrange at best (cf. Mason, 1992) and most imports were regulated via quotas. In general, the Japanese government kept close watch on how the economy was recovering in its effort to put the economy back on its feet.

Once recovery was no longer in question, bureaucrats only gradually gave up their control. After the mid-1970s industrial policy was largely aimed at stimulating basic research in the so-called 'sunrise' industries through government-industry research projects (e.g. the very large-scale integration (VLSI) project and the fifth generation computer project) and by winding down the so-called 'sunset' industries through various rationalization measures (cf. Okimoto, 1989; and Tyson and Zysman, 1989). Visionary high technology investment was urged (and at times partially funded) by the government, but three ingredients were important for making them work: support among the general public for government policies; financial support by the firms involved (to complement the bureaucratic financing, however minimal); and coordination. Depending on how well these three factors were managed, some projects succeeded while others failed.[8] The relationship between government and industry had changed dramatically.

Second, many analyses do not consider the military strategic motivations which shaped Japan's early economic recovery based on export promotion. Even though Vestal (1993), for example, considers noneconomic factors, security policy is not among them. Industrial policy explanations often neglect the important role of the US in the formulation of Japan's economic recovery policies usually because liberal ideology (particularly as it is

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[8] Three recent studies include Callon (1995) on high technology (mainly computer-related), Flamm (1996) on semiconductors and Fransman (1990) on computers.

interpreted by Americans) insists that the US has no industrial policy.[9] Military security in terms of US foreign policy was a critical factor that effectively supported Japan's postwar economic 'miracle' right up until the 1970s. Furthermore, despite the fact that the Japanese government was responsible for planning Japan's economic recovery in the late 1940s, the real power (until April 1952) was the Allied Occupation, or GHQ, run more or less by the US government. Japan's strategic geographic position and role as a strong American (political, economic and military) ally must be taken into account in any analysis of Japan's postwar history.

Third, liberal economic theory has blinded observers to such US policies in Japan as export promotion and import protection. In recent years, import substitution (i.e. export promotion and import protection) have gone out of favor with liberal economists who claim that such policies simply do not work. However, this is exactly what worked in early postwar Japan. The need to generate US dollars through exports to pay for imports was a primary motivating force behind Japan's industrial policy and overall economic growth strategy. General MacArthur is quoted as saying that he had "never seen a more tangled financial mess that that into which the Japanese government had fallen by the end of the war" (Manchester, 1978, p. 598). Without the flow of foreign exchange (in US dollars) into Japan to pay for the imports that the economy needed for survival, recovery might never have taken place.

The obvious method for earning US dollars was to export goods that American consumers wanted to buy and to recycle some of those dollar earnings into up-grading the industrial structure so that over time higher value-added goods could be exported. The higher the value of Japan's exports, the greater the earnings in US dollars, and the more quickly the economy would recover. Getting Japan -- and Western Europe -- back on its economic feet was a central objective of US foreign policy in the late 1940s.

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[9] This is, however, recognized by, for example, Cohen (1949) and Itoh and Kiyono (1988). See also chapter one.

Among those who support the argument that Japan's industrial structure has been shaped by export-oriented industries (and vice versa) are Motoshige Itoh and Kazuharu Kiyono (1988, pp. 156-157) who wrote:

> The magnitude of gains from trade accruing to a country is intricately related to its industrial structure. The higher the proportion of goods with high overseas demand entering the Japanese export menu and the higher the propensity in foreign countries to import these goods, the higher would be the levels of income and welfare in Japan. In order to be able to offer such an export menu, a matching industrial structure is a necessity. The advancement of the industrial structure in postwar Japan can be therefore interpreted, in a long-term perspective, as the process of change that enabled Japan to acquire an industrial structure conducive to such exports. Conversely, one may argue that it is these shifts in the industrial structure that have been responsible for the high rate of growth in the postwar Japanese economy.

According to Itoh and Kiyono, many sectors benefited from export promotion policies and import protection, both of which were vital to the growth of the Japanese economy. Their analysis, like that of many others, is unfortunately rather general.

This study of the photography industry indicates, however, that Itoh and Kiyono are correct in saying that it was necessary to build up export industries that required relatively few imports to generate US dollars so that higher value-added manufacturing industries could be (re-)established through the import of, among others, technology and raw materials.[10] The backbone recovery industries (including cameras/lenses and film) were the beneficiaries of export promotion and import protection and helped lay the foundation for the later development of higher value-added industries (what Johnson (1982, p. 228) referred to as 'heavy and chemical industrialization'). Increasing the value of exported goods was a key facet of Japan's industrial history (cf. Abé, 1997; Hidaka, 1997). It is also a key to understanding how

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[10] Others too have argued this thesis, notably Johnson (1982), but again the analyses are generalized to the whole economy.

economic recovery took hold and how Japan's economic growth came to be dependent on export sector expansion (cf. Calder, 1993). But, because it has not been fashionable to analyze export promotion and import protection (i.e. import substitution), little heed has been given in economic analyses to the success of this strategy in Japan's economic 'miracle.'

Part of the problem is that so many industries, particularly the non-strategic ones) have yet to be studied in any depth. This is why the industrial policy literature barely mentions Japan's photography industry. The degree to which cameras/lenses and film have been addressed in the literature is discussed next.

Industrial policy in the photography industry

Ryutaro Komiya (1988), one of the most prolific writers on Japan's industrial policy, explains in his introductory chapter to the volume *Industrial Policy of Japan* what were the circumstances in which industries could benefit from industrial policy. During the high growth era, he writes (pp. 2-6), two criteria had to be met by the prospective industry: 1) there would be a rapid increase in productivity; and 2) the goods produced would have a high income elasticity of demand. He then goes on to discount his own definition of industrial policy saying (p. 7),

> ...if goods are produced by an industry in which rapid productivity increases are occurring and for which the income elasticity of demand is high, then the industry will grow on its own. Hence there is no reason why, due to these two criteria, such an industry should be made a particular object for promotion.

As discussed above, industries with high income elasticities of demand were high value-added and usually high technology industries. So if Japan was to move toward an advanced industrial economy, it was imperative that these industries be encouraged (cf. Itoh *et al*, 1988b).

Figures from a study by Itoh and Kiyono (1988) indicate just how effectively exports with high income elasticities were promoted by the mid-1960s (see table 2.1). The income elasticity of Japan's exports, measured in terms of growth rates over the 1956/57 to 1964/65 period, was the highest at 3.55 of all 11 industrialized countries. For Japan's imports, the same figure ranked the lowest at 1.23, but the discrepancy between Japan's low figure and highest figure (Italy: 2.19) was not as great as in the category of income elasticity of exports (where the UK at 0.86 had the lowest figure). This indicates that it is Japan's exports, not imports, that are most out of line with other industrialized countries in terms of income elasticity. This is confirmed in the figures for the income elasticities of exports minus imports (D-E), where Japan at 2.32 was by far the highest of the 11 countries as compared to the US (at -0.52), and the UK (at -0.80) at the opposite end of the scale. Therefore, in terms of income elasticity of demand, Komiya's argument sounds rather hollow next to the evidence presented by Itoh and Kiyono.

Komiya also claimed in his 1988 piece that he has changed his definition of industrial policy over time to include two additional criteria (note 16, p. 22): there would be "a strong linkage effect to other industries;" and employment would be generated by the industries targeted by industrial policy. No doubt the evolution in his definition is linked to the practical application of policies to Japanese industry over the postwar period, discussed above. But it most surely must be colored by his own transformation from a professor at the University of Tokyo (opposed to MITI's central role in the Yawata-Fuji merger in the steel industry) to his post until 1997 as Director General of MITI's Research Institute of International Trade and Industry.[11]

Komiya (1988) defined two types of industrial policies: (a) those which affect the allocation of resources to industry including industrial infrastructure projects and measures affecting how resources are allocated between

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[11] Komiya is also professor of economics at Aoyama Gakuin University in Tokyo. He was succeeded at MITI's Research Institute by Masahiko Aoki.

Table 2.1 International Comparison of Growth Rates in GNP, Exports & Imports and Income Elasticity of Exports and Imports (1956/57 av. -- 1964/65)

	Rate of Growth			*Income Elasticity*		
	Real GNP (A)	*Exports (B)*	*Imports (C)*	*Exports (D)*	*Imports (E)*	*D-E*
Japan	9.8	14.2	11.5	3.55	1.23	2.32
West Germany	6.2	7.0	10.7	2.08	1.80	0.28
Italy	5.5	14.7	12.8	2.95	2.19	0.76
Denmark	5.2	7.7	9.6	1.69	1.31	0.38
France	5.1	7.9	6.3	1.53	1.66	-0.13
Netherlands	4.7	8.4	8.5	1.88	1.89	-0.01
Sweden	4.4	6.8	7.1	1.76	1.42	0.34
Norway	4.2	7.6	7.2	1.59	1.40	0.19
Belgium	3.9	7.2	7.2	1.83	1.94	-0.11
United States	3.6	4.9	5.2	0.99	1.51	-0.52
United Kingdom	3.3	3.3	4.2	0.86	1.66	-0.80

Notes: A--C calculated from Keizai Kikakucho Chosakyoku (1972), p. 331. For Japan, 1956/57 -- 1965/66. (B) exports of goods and services; (C) imports of goods and services. (D) and (E) from Houthakker and Magee (1969); Belgium is for Belgium and Luxembourg. For (D) income is world income.

Source: M. Itoh and K. Kiyono (1988) "Foreign Trade and Direct Investment" in R. Komiya *et al,* eds., *Industrial Policy of Japan* , London, Academic Press, p. 157.

industries; and (b) those which affect industrial organization including the internal organization of industries (e.g. consolidation of firms and investment and output adjustment) and cross-industry organization (e.g. measures toward small and medium-sized enterprises, protective tariffs and excise taxes on luxuries). The former type represents what was identified above as the liberal economists' view; it is a policy response to market failure. The latter type are noneconomic policies, so Komiya does not include them in his analysis. Industrial policy, he says (p. 7), was aimed at the industries "that government officials -- with the backing of public opinion -- felt Japan should have." These originally were "iron and steel, shipbuilding, a merchant marine, machine industries in general, heavy electrical equipment, and chemicals" and later included automobiles, petrochemicals, nuclear power, computers and semiconductors.

All other industries, if they were affected by industrial policies, were only influenced by what Komiya says are noneconomic policies. Thus, he states (pp. 7-8),

> ...during the period of rapid growth and into the next period, quite a few *new* industries developed, many of which achieved remarkable success in exporting. Early on were the industries that produced such goods as sewing machines, cameras, bicycles, motorcycles, pianos, zippers, and transistor radios. From the middle of the 1960s on, the list included the manufacturers of color televisions, tape recorders, magnetic recording tape, audio equipment, fishing gear, watches and clocks, calculators, electric wire, machine tools, numerically controlled machine tools, textile machinery, agricultural machinery, insulators, communications equipment, ceramics, and robots. *These industries developed without any dependence on industrial protection and promotion policies.* The majority of the firms in these growth industries started from nothing after the war or at most were very small firms. They developed under their own power without any particular benefits from industrial policy measures. [italics added]

Komiya would have us believe that his very narrow definition of industrial policy is all we need to understand Japan's postwar government-industry

relationship. This flies in the face of what many scholars have found *and* what happened in the photography industry. Noneconomic factors cannot simply be ignored if we are to understand Japan's postwar economic 'miracle.'

Komiya's comments raise many more questions than they answer. First, it would be difficult to substantiate his claim that sewing machines, cameras, and watches/clocks are 'new' industries in the postwar period (Uchida, 1985; Uchida, 1994).[12] Second, if one industry is promoted, such as "machine industries in general," then we must take into account the spillover effects to industries and/or firms outside of that particular industry (cf. Flamm, 1996; Tyson, 1991; and Uchida, 1994).[13] It is also unclear if "machine industries in general" include 'precision machinery,' which is one of the many classifications used for the photography industry. Machine tools and watches/clocks are also included in that group.[14] Komiya states that "machine industries in general" were promoted, but does not recognize the importance of spillover effects to other industries.

Third, exporters were helped by what became a very favorable exchange rate. According to Tsuru (1996, pp. 77-78),

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[12] Uchida (1985, pp. 179-196) notes in his history of the watch industry that Seiko was founded in 1893 but that the earliest manufacture of time pieces in Japan dates even earlier. By 1894, there were eight firms making time pieces. By the early 1930s, Japan's production of, among others, cameras, sewing machines, looms, knitting machines and telephone and telegraph apparatus exceeded imports (Uchida, 1994, p. 56). W. Mark Fruin (1992) seconds Uchida's view of the extent to which technology was imported in Japan in the prewar period to establish modern industries.

[13] Flamm (1996, p. 110) notes the spillover effect of the VLSI research in the government-industry joint laboratory saying; "The work carried out ... seems to have been productive. [...] The companies associated with developing and testing [the] equipment [that was developed] are a veritable who's who of today's semiconductor equipment and materials industry in Japan..." Two of the companies involved were Canon and Nikon (see chapter five). Uchida (1994) notes the spillover from numerically-controlled machine tools to the manufacturing processes of many industries and seconds Flamm's findings of spillover effects from semiconductors to cameras and other industries. Tyson (1991) notes the spillover effects from optoelectronics (optics + electronics) to many Japanese industries.

[14] Studies of the machine tool industry based on different points of departure have come to very different conclusions. Tilton (1996) found that industry associations, and thereby industrial policy, played a vital role in spreading information within the machine tool industry. However, Friedman (1988) using the assumptions of liberal economic analysis found no evidence of industrial policy in that industry.

> ...it appeared clear enough, during the early Occupation years, that a major reliance had to be placed on export demand if the economy was to continue on the growth path. ... [T]he dramatically yen-cheap exchange rate must have greatly helped the expansion of Japan's exports.

When Joseph Dodge set the exchange rate at 360 yen to the US dollar in April 1949, it was hoped that it would help mitigate the problems that his draconian measures to halt hyperinflation had caused (cf. Johnson, 1982; Tsuru, 1996). By the mid-1950s and until the first postwar revaluation of the yen in 1971, Japanese exports came to have a substantial price advantage in the US market and then in the European market.

Additional factors that have shaped the photography industry

Japan's international trade, domestic consumption, corporate competition, *keiretsu* structures and so forth have helped shape the government-industry relationship in Japan. First, the domestic market played an important role in the recovery of consumer goods industries, including the photography industry, as Komiya (1988) states, but it was not the only factor at work; export promotion and import protection played equally vital roles. Johnson (1982, p. 229), giving the credit for efficient economic planning to MITI minister Tanzan Ishibashi in 1954, writes,

> ...the key to exports was, of course, the lowering of costs, and the key to that was enlarging production to effect economies of scale. But to enlarge production, Japanese manufacturers needed more customers. And where were they to be found? In the huge potential market of Japan itself. [...] Ishibashi's idea was that MITI should promote *both* exports and domestic sales.

Export promotion *and* domestic demand would be used to off-set the fluctuations of the business cycle and ideally keep factories at full capacity at all times. According to Tomisaburo Hirai of MITI (quoted in Johnson, 1982, p.

229), Ishibashi "combined export promotion and high-speed growth into a coherent theory."

The editors of *The Economist* (1963, p. 56) found in 1962 that a typical Japanese economist would have replied in the following way to the question of whether the only sound type of growth was that "based on and led by exports:"

> I think the only industries in which we have seen export increases induce a production increment -- instead of the other way round -- are transistor radios *and perhaps cameras*. We do not all regard these industries as very soundly based because demand for them, especially transistors, may be saturated too soon. Export increases of all our other products have been induced mainly by expansion for the domestic market. [italics added]

Second, it is argued that the photography industry is important precisely because it was targeted very early (prior to the end of the Occupation) as an export industry, sustained growth over the postwar period could not have been achieved without healthy domestic sales. But domestic demand was stifled in the early postwar years by very high excise taxes, therefore exports (through the US military post exchanges at first, see chapter three) were induced. As the industry matured, the excise taxes were lowered, thanks more to political pressure than to bureaucratic initiative. Quickly thereafter, the domestic market became saturated as predicted and the largest, most able firms redoubled their efforts to create profits by developing new products to attract ever more customers and by building export sales and later overseas production (see chapters four and five).

Third, competition among the Japanese photography firms in the domestic market has been fierce due to what has been called the 'one-set principle.' In other words, each horizontal *keiretsu* group sustains one (or more) firm(s) in a particular industry through cross shareholding, i.e. one firm holds the shares of another firm which in turn holds its shares (cf. Gerlach,

1992; Tsuru, 1996).[15] The existence of tough competition among the photography firms in the Japanese market as well as overseas reduced the number of competitors in the industry from a list of more than 100 makers in 1950 to the handful of global leaders we see today. What is remarkable is that the firms leading the industry today are those which first made their marks as exporters; none of those that were solely dependent on the domestic market survives today.

Fourth, Shigeto Tsuru (1996, p. 29) wrote, the "cunning strategy [that] actually worked in the early postwar years" of relying on US military security while mobilizing Japan's meager resources for economic recovery "pav[ed] the way for the later economic resurgence." In other words, policies sanctioned by the Occupation authorities (and taken advantage of by the Japanese government) to promote Japan's economic recovery helped lay the foundations on which later successful economic growth could take hold.[16] Interestingly, this pre-dates what is commonly called the '1955 system,' i.e. the system which is usually credited with nurturing Japan's economic 'miracle.'[17]

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[15] In the Japanese photography industry, this is only true for the camera/lens makers; the photographic film makers are too few. Notably, several camera/lens makers are affiliated to one or more groups which indicates a certain level of independence. 'Excess competition' (or cut-throat competition) which can result from over-capacity and lead to the formation of recession cartels (to control prices and sales volumes while selling out surplus stock) has been a concern in the photography industry (see chapter four). For a discussion of excess competition and cartels see Itoh, *et al* (1988a).

[16] This reasoning is underscored by Tsuru (1996, pp. 78-81) in his discussion of the dual pricing system (i.e. export prices were lower than domestic prices) which allowed the sewing machine industry an early advantage in exports. A similar arrangement existed in the steel industry (Abe, 1997). The stories indicate that the recovery industries (including cameras and film) would make interesting comparative research projects.

[17] The '1955 system' comprises the following features of the postwar Japanese economy: lifetime employment, seniority system of wages, enterprise unions, the pervasiveness of horizontal *keiretsu* groupings and vertical distribution/supplier *keiretsu* networks and their interlocking shareholding system, large debt-equity ratios in firms, easy credit through the main bank system, Ministry of Finance 'window guidance' and Ministry of International Trade and Industry 'administrative guidance' which indicated the desired direction of industrial investment. The year 1955 is taken as the starting point because that was the year that the LDP consolidated its power and it was the start of the 'high growth' period. See, among others, Komiya, 1988 and Tsuru, 1996. Dissenting viewpoints to the effect that the 'system' pre-dates 1955 are represented by Noguchi (1995) and Okazaki (1994). On industrial policy in support of a pre-1955 system, Johnson (1982, p. 147) wrote: "...MCI [Ministry of Commerce and Industry, the precursor to MITI] after 1939 was much closer in form and orientation to the industrial policy apparatus of the high speed growth era than was MCI from 1925 to 1939."

Gradual liberalization of Japan's trade and investment policies based on Tsuru's principle of "being not too soon and not too late" (1996, pp. 112-115) appears to have occurred in the photography industry, first with cameras/lenses and then color film. Itoh and Kiyono (1988, pp. 155-156) second Tsuru's argument in terms of Japan's foreign trade and direct investment record saying:

> For better or worse, trade policies have contributed extensively to the rapid growth achieved by Japan. Broadly speaking, these policies were initially intended to deal with the foreign exchange constraint in the immediate postwar period but gradually came to serve as instruments for the protection of indigenous industry. The formulation of these policies during the 1970s was influenced to a large extent by the measures taken by Japan in order to stem the aggravating trade friction with its trading partners.

As explained in subsequent chapters, evidence from the photography industry resoundingly supports this observation. Export promotion and import protection policies were vital in the early years for Japan's economic recovery, but as the economy prospered and as international economic and political conditions changed, Japan came under increasing pressure to open markets and lower barriers to trade.

Fifth, generalizations for the whole 1945 to 1995 period simply do not hold. As Itoh and Kiyono (1988, p. 158) note, "Import quotas formed the core of the protection policy until the early 1960s" after which time "[t]he quantitative barriers came down sharply ... raising the relative importance of tariffs, the pecuniary import control measures." During the 1960s and early 1970s, heavier tariffs were imposed on imports of higher value added goods and were in fact higher than those levied either by the US or the EEC. They continue saying (p. 162), "[t]he tariffs on major machinery imports were relaxed only after this sector became internationally competitive and its export/production ratio rose." Their findings do not cover the photography industry however they indicate the same trend. The international economic

climate in the early 1970s was particularly important for the photographic film companies which unsuccessfully attempted to pursue export promotion and import protection at that time. One solution to the threat of international competition was to seize control domestic distribution through buying into most of the major wholesalers, i.e. gaining control through ownership. But this policy was not pursued by all firms (see chapter five).

Sixth, as outlined above, the security provided by the US military allowed Japan to recover using the meager resources available (cf. Tsuru, 1996). The industries that were the first to recover, the backbone recovery industries, required few imported inputs but supplied needed foreign exchange which in turn was used to purchase raw materials, energy and technology. These were utilized in order to create an industrial structure built on up-graded technology which was then used to produce export goods with high income elasticities of demand (i.e. high-technology consumer goods). Finance was provided through long and short-term lending from commercial banks (i.e. the city banks) and several government lending institutions, notably the Industrial Bank of Japan (IBJ) and the Japan Development Bank (JDB).[18] During the high growth period, industries that received loans from the JDB could more easily receive commercial bank financing because government (i.e. JDB) lending indicated which industries had been targeted for expansion (cf. Calder, 1993).

Seventh, cross-shareholding and ownership-control relationships developed over time, and are seen today as significant barriers to market entry by firms not currently operating in Japan (and even as a hindrance to commercial success by many firms that currently operate there). Finally, the most important aspect of industrial policy — and most difficult to analyze — is information and the flow of information among and between firms, industries,

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[18] The precursor to the JDB was the Reconstruction Finance Corporation, founded in January 1947 to supply "funds to industry, mainly for capital investment, and [to play] an important role in the priority production programme" (Hidaka, 1997, p. 143). Because of this the RFC concentrated on lending to basic industries. The IBJ, a prewar institution, was reconstructed to provide long-term industrial finance. See also Johnson (1978 and 1982).

quasi-government organizations and government agencies (cf. Dore, 1986; Fruin, 1992; Yonekura, 1996). This last factor has perhaps been the most crucial to sustaining the growth of the photography industry since the postwar period. These aspects of the evolution of the Japanese photography industry will be elaborated upon in the chapters that follow.

Thus, we see that industrial policy seen in strictly liberal economic terms (cf. Komiya, 1988) is inadequate for this analysis of the photography industry in Japan. Economic as well as noneconomic policies are essential to this story. In response to the narrow, liberal interpretation, scholars who consider noneconomic factors argue quite effectively -- but too generally -- about trends that appear to have great explanatory power for the photography industry (cf. Abé, 1997; Aoki *et al*, 1996; Itoh and Kiyono, 1988). But because they rely on the liberal view, their tendency is to dwell too heavily on market forces above all else. Conversely, Johnson's (1982) comparatively inclusive interpretation of the Japanese 'miracle' concentrates too heavily on bureaucrats as the main personalities in Japan's economic recovery. How would his story change if Japan's postwar recovery were told from the businessmen's (and they were surely all men in the 1950s and 1960s) point of view (cf. Callon, 1995)?

One analysis by Mark Ramseyer and Francis McCall Rosenbluth (1993) based on rational choice theory finds the politician's role in the Japanese economy as the most important. Any account whether dependent on bureaucrat, businessman or politician is skewed by personal experience, interpretation and/or ideology. What is missing is balance; an account that draws on the experiences and perspectives of all who were involved in Japan's economic recovery, not only bureaucrats, businessmen, and politicians. The problem is how to achieve this goal.

Instead of relying on the government-industry framework of industrial policy, a broader perspective such as that offered by international political economy is employed in this thesis. We need to move beyond the constraints

of traditional political and economic analysis and take a more eclectic approach by considering often neglected factors, e.g. firms, technology, security, human interaction and information exchange, different types of power and how all these factors change over time. Strange (1994) stresses the importance of using a broad framework within which a large variety of factors can be accounted for without emphasizing the importance of one over another but while stressing their interlinkages. And by asking the central question, 'who benefits?,' the path to de-mystifying how the Japanese economy recovered and prospered in the postwar period, using the photography industry as the case analyzed, becomes clearer.

What is missing?

Because ideologically-driven industrial policy approaches to Japan's government-industry relationship present difficulties for the analysis of the Japanese photography industry, neither the state-centered 'revisionist' view nor the liberal economic interpretation is stressed in this thesis. Instead, an eclectic, interdisciplinary approach steers the story of Japan's photography industry. This thesis is very dependent on history. The evidence from the historical record renders it difficult to fit the story of the photography industry easily into any one theory. This literature review concentrates on Japan's industrial policy because it addresses a central feature of any nation's economic history, the government-industry relationship.

However, several issues are not addressed in much of the industrial policy literature and if they were ignored this story of the Japanese photography industry would be significantly less rich. First, many analyses of Japan's government-industry relationship are general and because they do not examine industries in detail, highly generalized conclusions are drawn (e.g. Eads and Yamamura, 1987; Magaziner and Hout, 1980). False assumptions, for example, that industries (and firms) behave in the same fashion regardless of

what they produce are often made. Second, many scholars concentrate on the post-1970s period, overlooking the fact that Japan's industrial policy changed dramatically over the postwar period, particularly after the early 1970s (e.g. Callon, 1995; Fransman, 1990). Others have recognized the importance of historical perspective and the degree to which Japanese government policy has changed throughout the postwar years (e.g. Dore, 1986; Fruin, 1992; Vestal, 1993).

Third, the US is more the exception than the rule when it comes to government-industry relations and attitudes toward industrial policy. Every country has its own history and its own type of industrial policy. Two-country comparisons (as is often the case with US-Japan comparisons, e.g. Gerlach, 1992; Okimoto, 1989) might be enhanced with a broader view of the world. Fourth, interest in the differences as well as the similarities among industries and among firms has plummeted in recent years. Likewise, the tendency to 'fit' data to a particular ideological model or theory has grown (cf. Ramseyer and Rosenbluth, 1993). Fifth, many academic disciplines have strict boundaries (e.g. between business and economics, economics and politics) which should be crossed through, for example, the eclectic approach. If, for example, this thesis had ignored the roles played by firms, technology or information flows in the evolution of the Japanese photography industry, the conclusions would have been very different and may have compromised the usefulness of this research. Finally, the photography industry and the rise of multinationals in the industry tells a universal story of the globalization of business. This is where there appears to be a certain degree of convergence among industries and firms; certain similarities (i.e. among industries and among firms) appear to have developed that cross national borders.

What is clear is that many of the popular myths about Japan's economic miracle are simply wrong or at best are incomplete. Firms were not left to recover in the postwar period at the whim of market forces or the invisible hand. Likewise, omniscient bureaucrats did not simply agree to set forth

policies that organized the Japanese market and the firms within it to respond in predictable ways and in isolation from the rest of the world. The photography firms made decisions based on political, economic, social and historical factors that may or may not have involved cooperating with Japanese government policies. If (and when) firms had the power to affect their own profitability and survival, their actions may at times have looked like coordination with government policy and at other times not. But does policy follow firm behavior or the other way around? There does not seem to be a simple answer to that question. Each reacts with the other; they are interdependent. Policy may create a more competitive environment for firms or it may be formulated to support (or legitimize) events that are already occurring. The evidence presented in the following chapters indicates that government policy was at times beneficial and at times problematic for the firms in the Japanese photography industry. And despite popular beliefs, government intervention did occur.

3. The Road to Export Promotion

Introduction: A global industry

In February 1996, an 'international' consortium of one American and four Japanese photography companies (i.e. Canon, Fuji Photo Film, Kodak, Minolta and Nikon) introduced a new photographic standard, the Advanced Photo System (APS). The consortium was formed in the mid-1980s to set product standards for photographic film and cameras based on a new 24 mm high-resolution negative that integrates the traditional silver-halide process with digital technology. The film is easy to load into the cameras and allows for three finished image sizes. Because the new film is smaller than the old 35 mm standard, the new APS system allows for smaller, more compact cameras.

What is striking about APS is not the technology, but that it is a US-Japan venture, a case of 'coop-etition,' i.e. cooperation among competitors. It is particularly interesting that Kodak and Fuji Photo Film cooperated to develop APS over roughly the same period that Kodak brought a case against Fuji of market access in Japan. The case ended up at the World Trade Organization (WTO) in 1997, but two years earlier Kodak took it to the US government claiming that Fuji had violated Section 301 of the US Trade Act of 1974. Second, the consortium includes no German or European firms. How were world leaders such as Agfa, Ernst Leitz (maker of the Leica cameras), Franke and Heidecke (maker of Rollei cameras) and Zeiss (maker of Contax cameras) overtaken by their competitors? This important question will be addressed in chapter four.

Third, the APS consortium was formed under the general leadership of Kodak. In the US, film makers are also the camera and lens makers; they are comprehensive photographic goods manufacturers. Film is where money has

traditionally been made in the photography industry.[1] To some extend, the availability, format and international standards of film determine what types of cameras, photofinishing equipment and photographic paper is sold in the market. Until the early 1980s, Kodak's strategy was to control (as far as was possible) the format of the global photographic film industry.

As a world-leading photographic film manufacturer, Kodak exercised its control over film formats at least as far back as 1925 when Franke and Heidecke introduced a reflex camera called the Rolleidoscop (Lewis, 1991, pp. 38-41). The camera used 117 film for its 6 x 6 cm square format, but by 1930, the 117 film was in such short supply that the company was forced to replace the camera with a new model using the more popular 120 format (also 6 x 6 cm) or go out of business. Because Kodak was a key supplier of film at that time, the firm could exercise considerable control over which camera formats became successful in the market.

Recent Kodak film standards have included the 126 Instamatic drop-in cartridge (introduced in 1963), and the 110 Pocket Instamatic format (1972). In 1969, Minolta faced the problem of Kodak's dominance of world film standards when they introduced their 16 MG-S the first 16 mm (12 x 17 mm) cartridge film cameras. The problem this time was that 16 mm film processing was scarce in Japan, so when Kodak introduced its new 110 (13 x 17 mm) cartridge film, Minolta was forced to replace the camera with one that used the new Kodak standard (Lewis, 1991, pp. 130-131; 139). Both the Rollei and Minolta experiences show that camera firms did not drive the choice of popular camera and film formats, the photography firms — most notably Kodak — did.

But Kodak's dominance did not go unchallenged. In 1973, for example, Kodak faced two US lawsuits on charges of unfairly restraining competition. Bell and Howell brought charges against Kodak's Super-8 cine cameras and film (of 1972) and Berkey Photo brought them against Kodak's 126 and 110

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[1] Photofinishing is also a lucrative part of the industry.

cartridge film formats. In both cases, the American firms claimed that Kodak obstructed the market through "its marketing practice of coupling new cameras with films especially designed for them" (Lewis, 1991, p. 140).

Problems continued for Kodak when in 1976 Polaroid brought a patent infringement case against the company for manufacturing and selling instant cameras. Edwin Land, founder of Polaroid, invented the SX-70 Land cameras and instant film and introduced them in 1972. The case was finally settled (in a multi-million dollar settlement) in 1986 in Polaroid's favor for costs incurred and loss of market share. Kodak was forced to stop manufacturing instant cameras and recall and then destroy all of its instant cameras already sold in the world market (cf. Sieg, 1994; Wurman, 1989).

Kodak's ultimate disaster was the Disc camera and film launched in 1982. Within two years, the Disc system was recognized as a failure (Lewis, 1991, pp. 169-170). The negative was so small (8.2 x 10.6 mm) and the prints it produced so poor that the public simply rejected it.[2] The timing of the introduction of the Disc system was also a factor in its failure. Compact 35 mm cameras were growing in popularity and Kodak and Fuji Photo Film were beginning to compete in making very fast, high resolution 35 mm film.

Kodak had until that time been *the* photographic film leader. The firm could no longer risk introducing new film and camera formats on the world market all alone, i.e. not without the cooperation of other leading photography firms. By the 1980s, the photography market had become global and the costs associated with new product introductions had grown too high for one firm to bear, especially if they turned out to be failures. The nature of global competition had changed and competitors were forced to collaborate on new technology development.

In Japan, the APS consortium created conflict not only between the two film makers (i.e. Fuji Photo Film and Konica) but also among the 'big five'

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[2] Few camera manufacturers in Japan chose to manufacture Disc cameras, believing that the system would not appeal to Japanese consumers. Neither the 110 nor the 126 formats were particularly successful in Japan either.

camera firms (i.e. Asahi Optical/Pentax, Canon, Minolta, Nikon and Olympus). Of the seven leading firms in Japan, only four joined the consortium. This upset the power balance among the leading Japanese manufacturers and caused communication problems within the two photography industry associations, the Photo-Sensitive Materials Industry Association (PSMA) controlled by Fuji and Konica, and the Japan Camera Industry Association (JCIA) controlled by the 'big five.' Industry associations in Japan are important information channels for the member firms and they act as liaisons between the industry and its relevant government agency. Since three firms (i.e. two of the JCIA 'big five' firms, Asahi Optical and Olympus, and one main PSMA firm, Konica) were left out of the new consortium, the flow of information among the seven leading Japanese photography firms was disrupted. The impact of the APS consortium on the PSMA and the JCIA both of which played crucial roles in the evolution of the photography industry in Japan will be clarified in this chapter.

Historical foundations

Kodak was a 'first mover' (Chandler, 1988) in photographic film manufacture and effectively exploited its patents to establish a near monopoly in the industry in the United States by roughly 1920. The Kodak system was a box camera fitted with roll film (ca. 1888) based on the company's motto 'You push the button, we do the rest.' Pure amateurs could snap photographs and simply send the camera with the film still inside to Kodak for film processing. The prints, negatives and camera loaded with a fresh roll of film were returned to the photographer. Playing on the theme 'we do the rest', Brayer (1996, p. 67) writes, ""We" had done more than invent a camera; "we" had a vision and were developing a whole system that included the machinery and standardized parts to deliver it."

George Eastman, Kodak's founder, realized that "it would be the sale of

film, not cameras, that was the key to the success of the system" (Brayer, 1996, p. 68). This observation proved to be highly lucrative for the company and, as shown above, provides a key to understanding later developments in the industry. When Kodak began to manufacture film in the "endless strips needed for motion pictures" (Brayer, 1996, p. 111), it was primarily to lower production costs, not due to demand from Thomas Edison's new motion picture industry. Kodak's success in manufacturing cine film (i.e. motion picture film stock), despite competition from a number of mainly European firms, is attributed to Kodak's exceptionally high standards of quality (Jenkins, 1975, p. 278). It was the first time that quality drove supply rather than it being managed by the fierce defense of patents, as had characterized the early years of the industry (i.e. the late 1800s). Nonetheless, Eastman assured his company's financial position in 1908 by joining a monopoly, the Motion Picture Patents Company, with the other leading motion picture firms in the US and France. As the only manufacturer of motion picture film stock, Eastman sold only to the trust for a three-year period after which the monopoly went sour (Brayer, 1996, esp. ch. 7; Jenkins, 1975, pp. 282-292).

Most of the company's profits and human resources went into making cine film. To gain greater control of the industry, George Eastman's strategy was to integrate horizontally by purchasing competing firms (e.g. Artura, Graflex (then Century-Folmer), Hawkeye and Premo) and gaining control of all of their major patents. US antitrust laws, especially after the passage of the 1914 Clayton Act, put an end to this practice, but it was already too late. Kodak controlled the film industry. A 1915 US government ruling stated that Kodak was intent on monopolizing the industry, and the company was forced to spin off several corporate divisions and trade names, including Graflex (which later became part of Singer). At this time, Kodak's main competitor was Agfa of Germany (Brayer, 1996, pp. 389-401; Jenkins, 1975, pp. 318-324).

To raise the firm's technological level, the Eastman Kodak Research Laboratory was established in 1913. Because Kodak maintained the policy of

prioritizing film manufacturing over cameras, the lab concentrated on developing photographic chemical processes, particularly non-flammable 'safety' film and color photography. Many of Kodak's cameras and lenses were supplied by firms in the US and Germany. Lenses and shutters came primarily from Bausch and Lomb (also based in Rochester, NY) for the majority of the Kodak line while high-quality optics for the most expensive cameras were supplied by German firms (Jenkins, 1975, pp. 214; 323). In 1910, Kodak began to develop its own optics line which eventually replaced those supplied by Bausch and Lomb. A decade later, Kenneth Mees, head of the Research Laboratory, began to take "a more systematic approach to product innovation in the apparatus sector" by establishing the Mechanical Development Laboratory (Jenkins, 1975, p. 313). Despite Mees' recognition of Kodak's need to develop cameras and lenses, advances in photographic film continued to drive the development of Kodak's products.

Kodak established an overseas presence first in Britain in 1885 and eleven years later opened an office in Japan (Brayer, 1996, pp. 73; 164). The photographic chemical industry was strong in Europe; one company in Germany even had a world monopoly in the production of the very pure paper which was needed for photographic prints in the late 1890s (Jenkins, 1975, pp. 195-199). Nonetheless, superior management and marketing put Kodak in the forefront of the industry and international markets were an important part of the firm's strategy.

Asahi Photo Industry Co. made the first Japanese roll film (called Kiku or chrysanthemum) in 1928, and the following year Konica introduced Sakura (or cherry) film (Lewis, 1991, p. 38). Close ties between the Japanese government (i.e. Ministry of Commerce and Industry) and Dai-Nippon Celluloid (part of the Mitsui *zaibatsu*) were behind *kokusanka,* i.e. domestic manufacture, of photographic film (Fuji Photo Film, 1984, pp. 2-5; 16-18; 22-24; 28). This led to the establishment in 1934 of Fuji Photo Film and the introduction of Fuji brand sheet film, dry plates and sensitized paper within

that year; roll film was introduced in 1936. The aim of *kokusanka* was to reduce Japan's reliance on imported German and American film (JCIA, 1987, p. 174). Close ties between Fuji and the Japanese government continued in the postwar period (see chapter five). Today, Eastman Kodak and Agfa as well as Fuji Photo Film and Konica offer a broad spectrum of photographic products across international markets .[3]

By 1925, Oskar Barnack of Germany had developed a small rangefinder camera, the Leica A, which took advantage of the easily available 35 mm movie film. Until that time cameras had been quite a bit simpler. Most were box cameras, like the Kodak system cameras, that were outfitted either with glass plates or roll film, usually 4.5 x 6 cm or 6 x 6 cm in size. The Leica was important because it employed a smaller film negative which directly affected the size of the camera. In addition, it came equipped with a highly-sophisticated lens which allowed the photographer to adjust the aperture and the focal length. Although certainly not small by today's standards, it was the first in a long line of popular 'miniature' 35 mm cameras. Two copies of the Leica A, the Hansa Canon produced by Canon (then Seiki Kogaku Kenkyusho) and the Super Olympic marketed by Asahi Bussan, appeared in Japan by 1935.[4]

The beginning of the modern photography industry in Japan is taken to be after the mid-1930s in this thesis. Over the course of the modern period, the Japanese makers have diversified their product lines within their core competence, that is, optics technology, to produce photocopiers, facsimiles, steppers (for manufacturing semiconductors) and medical equipment such as endoscopes. Over time, optics-based products became more complex, employing electronics and computer chips, and this knowledge was channeled back into the 'older technology' products including cameras. This pattern of

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[3] Other competitors are in niche markets: Ilford (UK) specializes in black and white film, Pathé (France) in cinematographic film.

[4] The Kwanon, the prototype of the Hansa Canon, was introduced in the same year (Condax, *et al*, 1984, p. 12). Lewis (1991, p. 53) does not provide the name of the manufacturer of the Super Olympic.

cross-fertilization of knowledge among products, or 'organizational learning' (Fruin, 1992, pp. 5, 22-23; 211-212) was crucial for this type of product development to occur. Mark Fruin (1992, p. 212) found that the Japanese enterprise system is organized in focal factories which are in turn organized "for functional integration and product/process innovation rather than mass production" and that this is a managerial decision connected closely to his concept of organizational learning. Managerial decisions regarding firm organization were surely important to the success of firms in the photography industry, but as this thesis shows organizational learning *and* mass production have both been crucial ingredients of success (see chapters four and five).

Optics technology, the core technology of the photography industry, was transferred to Japan mainly by Germans who were brought to Japan or who set up joint ventures with Japanese entrepreneurs.[5] The firms known today as the 'big five' camera manufacturers, i.e. Canon, Minolta, Nikon, Asahi Optical (makers of the Pentax brand) and Olympus Optical, were all established by the mid-1930s. On the film side, Konica and Fuji Photo Film, the two main companies, were also well established by that time.[6] During the decade 1935 to 1945, the industry was generally controlled by military regulations that limited production to optical weapons. Real growth and innovation in the industry as a market-oriented consumer industry did not begin until after the war.

The photography industry during the pre-WWII period was formed by direct military support for technology transfer to the optics industry. As early as 1915, the Japanese Departments of Navy and Agriculture supported the development of an optical glass industry in response to the shortage of German imported optical goods during WWI. According to Fruin (1992, p. 38),

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[5] Minolta was set up in 1928 as a German-Japanese joint venture called Nichi-Doku Shashinki Shokai and Nikon employed eight German engineers and scientists in the 1920s (Condax *et al*, 1984, p. 13; Nikon, 1993, pp. 19-20; 32-47).

[6] The dates were: Canon: 1933, Minolta: 1928, Nikon: 1917, Asahi Optical: 1919, Olympus Optical: 1919, Konica: 1873, and Fuji Photo Film: 1934. Pentax is the brand name of Asahi Optical's cameras.

industries based mainly on imported technology were not unusual in Japan given that the economy was in the position of being a 'late developer' (cf. Fruin, 1992; Minami, 1994).

The decade of 1935 to 1945 showed rapid growth in the world-wide photography industry (mainly in Europe but also in Japan) due to the military demand for weapons-related lenses and sights. Aerial surveillance required large, sturdy cameras and precision telescopic lenses; spy cameras required miniaturization. In Japan, the New Economic Structure ordinances restricted the production of civilian goods in 1940, and civilian production was completely banned in 1942 under the Industrial Conversion Ordinance. Japanese camera production therefore reached a peak in 1940 at 218,659 units (see chapter two, table 2.1). After 1942, all photographic goods were supplied to the military and commercial sales did not resume until after the war when all military industries were re-converted to civilian production (Lewis, 1991, pp. 55-57).

During the war, the optical goods makers generally supplied military-use optical products either to the army or to the navy, each of which controlled its own air force units. The twin air forces were the primary sources of military demand (and rivalry) for optical products which had gained in strategic importance along with the new, important role played by the airplane in World War II. Rivalry between the army and the navy for money and materiel to build aircraft amounted to a wasteful one-upsmanship competition (Cohen, 1949, pp. 208-212). Cohen (1949, pp. 58-66) discusses the general lack of centralized administrative control which often led to either the oversupply or the undersupply of war materiel. Samuels (1994, pp. 126-129) also emphasizes the problems of the Japanese wartime aircraft industry, especially noting the army-navy rivalry. However, the problem was not limited to the Japanese military. Col. Roy Stanley, II (1981, p. 65) of the US Air Force comments that during war in the Pacific theater, rivalry between the US army and navy at times constituted "the REAL war."

Aerial photoreconnaissance and the interpretation of strategic photographs were important for gathering military and strategic intelligence including map making. General Claire Chennault is said to have written, "80 percent of vital wartime [WWII] intelligence came from aerial photos" (Stanley, 1981, p. 3, note). The main elements of optical reconnaissance were aerial cameras, binoculars, sights, telescopes and powerful telephoto lenses. According to Stanley (1981, p. 11):

> Aerial photoreconnaissance ... was intentional coverage of enemy territory. [It] was ... different in form from movies or still photography – it lay somewhere in between them mechanically. [...] This imagery was neither aesthetic nor entertaining; it was work photography. [...] The flight requirements of mapping missions were very different from those of reconnaissance missions. In both cases the flight profile, aircraft, and camera combinations had to be carefully tailored to cover the area targeted ... to best answer the intelligence or mapping collection problem.

Demand for improvements in the quality of camera equipment, photographic lenses and other optics increased throughout the war years, and not only in Japan.

During the war, most of the top Japanese manufacturers of photographic lenses received direct support from the navy and/or the army for the production of optical weapons. Among the photography firms, only Nikon, Fuji Photo Film and Minolta manufactured optical glass. Fuji Photo Film established an optical division in 1939 to manufacture optical glass and in March 1944, the division merged with a number of other companies to form Fuji Shashin Koki (JCIA, 1987, p. 14). Nikon (then Nippon Kogaku or Nikko for short) was directly funded – and at times even run by – Imperial Navy officers and Tokyo Optical (Tokyo Kogaku or Toko for short) was supported directly by the Imperial Army. They came to be known in Japan as "Nikko of the sea, Toko of the land" (*kai no Nikko, riku no Toko*) (Ogura, 1994, p. 114).[7]

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[7] See Nikon Corp. (1993, pp. 14-19) for details on the involvement of Mitsubishi Ltd., which worked very closely with the navy, in the establishment of Nikon.

Minolta, the only manufacturer in the Kansai area (the Kyoto-Osaka-Kobe region), supplied primarily the army, but in 1942 was ordered by the navy to establish an optical glass factory at Itami near Kobe.[8]

There seems to be some disagreement over which companies were affiliated with which parts of the military, but Olympus (then Takachiho Seisakusho) and Petri Camera (then Kuribayashi Seisakusho) appear to have been affiliated with the navy, while Konica, Canon, and Fuji Photo Film were more closely affiliated with the army.[9] In addition to producing goods falling into the general category 'optical weapons,' Konica, Minolta, Olympus, Nikon, and Fuji Photo Film manufactured aerial cameras, Olympus, Minolta and Nikon manufactured binoculars, Canon made on-plane aerial enlargers, and Nikon made photographic lenses and precision telescopes (JCIA, 1987, p. 14).

Optics technology was crucial to the Axis powers during the war because unlike the Allies they did not develop radar. As a consequence, the photography industry grew in importance during the Pacific War both for sea and air operations, for weapon sights, binoculars and aerial photoreconnaissance. When Japanese industries were re-converted to *heiwa sangyo*, i.e. 'peace industries,' during the Occupation, both the camera/lens and film manufacturers were among those designated to become producers of civilian goods (Seki *et al*, 1961). Consequently, military-trained optics engineers found it easy to apply their skills in the photography industry (cf. Samuels, 1994). Later, export promotion and inter-firm rivalry helped boost profits and stimulate creativity in the industry. In combination with a favorable domestic and international climate, Japanese photographic firms was able capture the postwar technological lead definitively in cameras and lenses, but somewhat less so in photographic film and paper (see chapters four and five).

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[8] This information is based on Condax *et al*, 1984, pp. 12-13 and interviews with Canon and Minolta, 1994 and 1996

[9] Petri Camera Co. was founded in 1907. It declared bankruptcy in 1977, continuing limited production until 1979. See Condax *et al*, 1984, p. 14.

"Export or die"

Chalmers Johnson (1982, p. 241) observed that between 1945 and 1961, the Japanese economy was "in a war for national survival." And to survive, there had to be enough foreign exchange to pay for necessary imports. So exports were promoted and imports were controlled through quotas and tariffs. In other words, the situation for the photography industry amounted to that of "export or die" (*yushutsu ka shi ka*) (Yayama and Ito, 1988, p. 331).

Japan's post-1945 shift to a peaceful, democratic political system and a capitalist economy is usually divided into two periods with 1948 being the watershed year. That was when US policy toward Japan changed from allowing subsistence level recovery to promoting full economic recovery. Occupation policy after 1948 was based on a determined US foreign policy aimed at proving the superiority of the American capitalist system and was reinforced by two important events in East Asia: Chairman Mao's victory in China in 1949 and the outbreak of the Korean War the following year. Japan quickly became one of the key outposts of American security policy in East Asia and a bulwark against the spread of Communism in the region (cf. Nakamura, 1981; Tsuru, 1996).

In 1948, the Economic Stabilization Board (ESB) of the Japanese government drafted two recovery plans, the "Five-Year Plan for Japan's Economic Rehabilitation" in January and the "Outline of Japanese Economic Stabilization Plan" of 17 May (Cohen, 1949, p. 501; note 197). The first gave "a detailed plan for the rehabilitation of major industries for each year, beginning fiscal 1948-49 (April 1-March 31) and ending in fiscal 1952-53. The second...covers only the target year 1952-53," by which time it was estimated that Japan would just about be self-supporting. The aim was to get the economy on track (i.e. achieve 'stabilization') so that the Japanese government would no longer require US aid. To achieve that goal (p. 501),

> ...the plan contemplates more than a threefold increase (over 1947) in mining and manufacturing, a ninefold increase in exports, a threefold increase in imports, a twofold increase in labor productivity, and a twofold increase in the real national income in the target year. [...] [I]t is further assumed that over two billion US dollars will be forthcoming during the interim period.

The money would come from the US Treasury and would be used to pay for Japan's imports of American goods and payments of licensing fees to US firms. The objectives of this plan could not be met unless inflation in Japan was controlled, the instability in East Asia was settled and the free exchange of currencies was reinstated. Furthermore, credit from private (non-Japanese) sources was to be used to modernize key industries and stimulate export industries, and crucial issues, e.g. energy supply and transportation, had to be solved.[10] According to the ESB, the very fragile Japanese economy of 1948 would only begin to 'stabilize' after the plans were set in motion, but the process of recovery would not be complete until 1952, when the Occupation would end.

A single, official exchange rate was set by Joseph Dodge in April 1949 at 360 yen to the dollar as part of his 'Dodge Line' which recommended drastic measures to bring the economy under control. Prior to that date, there was no official rate at which the value of exports and imports could be calculated precisely (cf. Nakamura, 1981). Because Japan needed vast quantities of imports, it was not uncommon for exports to be calculated at a more favorable rate than imports so that more foreign exchange was generated through exports than was used on the imports (cf. Cohen, 1949). The fuzziness of the system before 1949 created a favorable climate for Japanese trade, because of the country's heavy reliance on US imports. Dodge's official rate was seen as

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[10] The plans were well covered in the English and Japanese press (Cohen, 1949, pp. 501-502, note 198). One of the members of the Economic Stabilization Board (until February 1948) was Shigeto Tsuru (Tsuru, 1996, pp. 14-18; 44). Another was politician Kinji Moriyama who became an influential figure in the photography industry (see below).

slightly undervaluing the yen to allow the economy the favorable terms of trade it needed to recover, because originally, a rate of 330 yen to the dollar had been recommended by the US government (Tsuru, 1996). However, as Tsuru (1996) stresses, setting the exchange rate was at that time like trying to hit a moving target, because the Japanese economy was in tatters suffering from rampant inflation and persistent black markets. Most importantly for the photography industry, camera, lens and film exports to the US were promoted, and the favorable exchange rate help off-set the cost of imports and eventually eliminated Japan's dependence on US subsidies.

Recall that in chapter one (table 1.1), production volumes of cameras were compared to other industries and that by 1951 camera production had nearly recovered to its prewar peak. Table 3.1 shows that exports (in value terms) took off right away; more than one third of production was exported in 1947 and two years later fully 86 percent of production went to export markets.[11] Even though the export ratio dropped after 1952 to a low of 19 percent in 1955, well over one-third of output was exported from 1956 to 1960.[12] The industry showed an average annual growth rate of nearly nine percent over the 1949 to 1960 period both in terms of total value and value of exports. But from 1954 to 1960, export values grew, on an average annual basis, faster than total production at almost 14 as compared to 12 percent. How and why was the photography industry able to recover so quickly to become an export industry? In other words, how did the firms 'learn' to export so quickly?

First, there was no shortage of silica to manufacture optical glass for photographic lenses and most of the raw materials needed to manufacture

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[11] The figures for export values in 1947 and 1948 must be treated as indicative only since the single exchange rate was not set until 1949. Most of the data for wartime production (e.g. table 1.1) is also not perfectly reliable (Cohen, 1949, pp. 68-69, footnote 39).

[12] Even before the end of WWII, more than 50 percent of camera output was exported to the yen bloc countries, i.e. China, Manchuria and Korea (Miyabayashi, 1963, p. 12).

Table 3.1 Japan's Camera Production and Export Ratios, 1947-1960
(unit, millions of yen, percent)

	Total (Quantity)	*Total (Value)*	*Exports (Value)*	*Export Ratio*
1947	51,772	88.8	33.3	37.5
1948	53,016	359.4	175.6	48.9
1949	83,243	911.7	785.2	86.1
1950	117,481	1,212.3	831.7	68.6
1951	213,840	2,957.1	1,596.2	54.0
1952	416,779	4,684.6	2,087.5	44.6
1953	632,616	7,347.8	2,004.6	27.3
1954	883,600	9,371.9	2,156.7	23.0
1955	1,064,902	13,686.1	2,623.3	19.2
1956	1,306,600	13,462.9	4,370.8	32.5
1957	1,545,245	16,973.6	6,170.8	36.4
1958	1,459,302	16,956.0	5,591.5	33.0
1959	2,011,785	27,756.0	9,449.3	34.0
1960	2,031,849	34,099.9	12,453.1	36.5

Note: Export ratios are calculated.

Sources: For 1947-54 unit production see A. Miyabayashi (1963) "Japanese Camera Exports to the United States: A Case Study in Development and Competition," MBA Thesis, City University of New York, June, pp. 16,18; for other 1947-54 data see Tokyo Prefecture, Economics Agency (1956) *Kamera Seizogyo no Jittai Bunseki* (The Present Status of the Camera Manufacturing Industry) Tokyo, p. 12; for 1955-60 data see A. Miyabayashi (1963), p. 21 based on MITI statistics.

cameras (e.g. leather and metals) were readily available in Japan. Second, skills and know-how to make cameras and lenses were plentiful since optics technology had been developed to support the war effort. Third, as noted above, in the re-conversion to peacetime production, the camera/lens companies could easily hire highly-skilled engineers who had been trained by the military for optics work (cf. Samuels, 1994).[13]

This last point was true for most of the industry, although there were exceptions. Canon, one of the leading camera manufacturers during the prewar years, was forced to begin manufacturing its own optics in the late 1940s. The problem was that Canon's prewar supplier, Nikon (one of Japan's leading optics makers), could not supply the quantity of lenses demanded due to irregularities in the supply of silica and temporary shortages of metals (Lewis, 1991). To get up to speed in making optics, Canon was forced to hire aggressively, paying more than its competitors to attract the best employees some of whom came from Nikon (*Camerart*, February 1990). Nikon then found itself in the position of having to recover from Canon's poaching tactics and the loss of a customer.

Fourth, immediately after the war, all companies were required to apply for permits from GHQ to resume production and most photography firms received them between October 1945 and the early months of 1946 (JCIA, 1987, p. 14; Lewis, 1991, p. 59). The criteria to be satisfied included not producing military goods and not requiring large quantities of imported materials. The camera/lens firms were encouraged to recover by GHQ, but the photographic film manufacturers were given lower priority. The *zaibatsu* dissolution policy (i.e. deconcentration of the family-owned holding companies organized as industrial groups that had collaborated with the war effort) meant that Fuji Photo Film was unable to restart postwar production

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[13] Interview with Professor Hoshimi Uchida, Tokyo Keizai Daigaku, Spring 1996. Film was also designated as a 'peace' industry (Seki *et al*, 1961).

until 1949, because it had been established under the auspices of Dai-Nippon Celluloid, a member of the Mitsui *zaibatsu* (Fuji Photo Film, 1984, pp. 56-57).

After 1948, Japan's economic recovery took precedence and deconcentration lost favor (cf. West Germany). Policymakers in the US and Japan realized that some functioning economic enterprises had to be left intact if Japan's economy was to recover (cf. Tsuru, 1996). It was a practical measure to prevent Japan from becoming a drain on US taxpayers. The consequence was that photographic film makers were once again permitted to pursue civilian production. Film technology was not as advanced in Japan as elsewhere in the world (particularly the US and Germany), so firms were protected from film imports first through total bans and then through import quotas. These restrictions were not completely lifted until the early 1970s by which time the Japanese film manufacturers had achieved improvements in technology and production that prepared them to withstand international competition.

Cameras and lenses, not film, played an important role in Japan's early postwar recovery from roughly 1949 to 1973 which was the heyday of Japan's export promotion policy.[14] The occupation experience in Germany had shown that military forces stationed there bought significant numbers of German cameras and Swiss watches. It was reasoned that military personnel in Japan would behave in the same manner and purchase Japanese cameras and watches. The goods were 'exported' through the American military post exchanges (PXs) because all purchases there were made with US dollars. The sales would generate badly needed foreign exchange which through various controls would be used for imports of basic necessities and then reinvested in industry (e.g. by purchasing capital equipment and paying licensing fees). Both cameras and film required very few imports and had very high foreign exchange earning ratios (see table 3.2).[15] Cameras generated between 98 and 99

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[14] The *Japan Statistical Yearbook* (Management and Coordination Agency, 1950) indicates that camera and lenses were included in the designation 'important industries' as of the late 1940s.
[15] Foreign exchange earning ratio = (export price - import price of materials)/export price.

Table 3.2 Foreign Exchange Earning Ratios of Major Japanese Exports, 1952-1959 (percent)

	Cameras [a]	*Film*	*Fountain Pens*	*Sewing Machines*	*Watches*	*Ships*	*Bicycles*	*Cotton Textiles*	*Woolen Textiles*	*Binoculars* [b]
1952	99.2	...	98.0	96.4	96.0	93.5	92.3	50.5	35.0	...
1953	98.1	...	99.0	97.0	95.7	92.1	89.9	50.2	37.0	...
1954	99.1	83.3	99.8	95.0	96.9	90.9	89.8	49.0	33.8	97.8
1955	98.4	...	99.4	93.0	96.2	90.4	88.4	52.3	55.1	96.5
1956	98.0	75.1	99.7	96.6	96.8	89.1	88.0	59.5	34.3	97.4
1957	97.5	78.2	99.8	96.7	93.0	87.9	89.7	60.0	59.3	97.3
1958	97.1	86.1	99.3	94.4	97.8	88.6	89.8	61.1	63.8	96.2
1959	98.5	88.6	100.0	97.0	95.2	83.8	87.7	68.4	53.2	94.2

Notes: [a] Figures for 1952 and 1953 based on Konica models; 1954-59 based on Canon models.
[b] 7x50 type
Foreign exchange earning ratio = (export price - price of imported materials) / export price

Source: Adapted from A. Miyabayashi (1963) "Japanese Camera Exports to the United States: A Case Study in Development and Competition," MBA Thesis, City University of New York, June, p. 69, based on Economic Planning Agency statistics in M. Seki, M. Takeuchi & H. Yaguchi (1961) *Kamera Fuirumu* (Camera and Film) Tokyo, Yugenkaku, p. 82.

percent foreign exchange (i.e. US dollars) while film earnings ranged between 75 and 88 percent during the 1950s. Along with other backbone recovery industries (e.g. fountain pens, sewing machines, watches, binoculars, ships and bicycles), cameras were ideally suited for export promotion beginning with 'domestic exports' to the PXs.

At first, a '100 percent policy' went into force: all cameras produced in Japan were sold through the PXs as 'exports.' According to the editors of *Camerart* (January 1988, p. 23), GHQ issued the following three instructions in October 1948:

> 1) Licenses shall be granted to produce cameras either confirmed by record for actual export or which are clearly intended for export. 2) Licenses shall be granted for camera production for the domestic market [and] limit[ed] only [to] sale[s] to the Occupation Forces. 3) Licensed manufacturers shall be obliged to limit their production to the amounts for export and/or supplying the Occupation Forces.

As described above, GHQ (and the Japanese government) enforced exchange controls between 1945 and early 1949, which made it impossible to export via other channels. Because of the 100 percent policy, the domestic market was closed to camera and lens (and film) sales, but the problem of pent up domestic demand (consumption had also been stifled throughout the war) meant that black markets developed.[16] Consequently, the 100 percent policy was changed to 80-20, that is 80 percent of production went to the PXs and 20 percent to the domestic market. The figures given in table 3.1 are therefore somewhat misleading because there was no single exchange rate before 1949 and because it is unclear if PX sales are included in the export figures. They might best be seen as indicators of a growth trend in camera production and exports.

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[16] Tsuru (1996, pp. 16-17) notes that black markets were prevalent in many sectors of the economy. This problem was attacked in the First Economic White Paper prepared in 1947 by the Economic Stabilization Board under Tsuru's guidance.

Several manufacturing problems faced the camera industry in the late 1940s. Many factories needed rebuilding, most needed retooling and many raw materials were temporarily in short supply due to wartime dislocations. Camera shutters were particularly scarce. But perhaps most importantly, the camera models being produced were old-fashioned 1930s models, because wartime production controls had prevented firms from up-dating their manufacturing facilities (Lewis, 1991, p. 60). However, capital was sorely needed to upgrade and replace machinery and equipment (cf. Cohen, 1949). One measure devised by GHQ to help the industry get back on its feet, secured money from the US government to allow four Japanese firms – the three camera makers Canon, Minolta, Nikon and one watch and camera shutter maker Seiko – to import precision machine tools from Switzerland (Kusumoto, 1989, pp. 67-68). Swiss machine tools were considered to be the best in the world at that time for the manufacture of precision machinery, e.g. cameras and watches.

Nikon and Canon concentrated on developing the 35 mm format cameras mainly by copying and improving upon two German cameras, the Leica (made by Ernst Leitz) and Contax (made by Zeiss Ikon). Minolta also worked on the 35 mm format but was less keen on copying other firms' cameras. One improvement Minolta and Nikon came up with was to change the film format from 35 mm (24 x 36 mm frame) to 24 x 32 mm which was generally thought to be more suitable to graphic art and photographic printing (*Camerart,* February 1990). The 35 mm format, based on the readily available cine film of the 1920s that was mass produced by Kodak, had become the industry standard. Because GHQ thought the new format would not sell in the US market (dominated by Kodak), they did not approve of the new film size or the new cameras and prohibited their sale at the PXs. Japanese firms instead had to concentrate on improving existing 35 mm cameras., because as higher value-added goods they earned more US dollars than the old-fashioned

models (e.g. folding cameras and twin-reflex cameras), and as noted above, the firms had to supply 80 percent of their production to the PXs.

GHQ's policy (in tune with by the objectives of the ESB) was important in that it immediately oriented the photography industry toward exports which helped build a market for Japanese goods the US, the largest market for photographic products, even before the Occupation had ended. This was the industry's first contact with export promotion. It was an effective way of encouraging consumer goods production by companies such as Nikon which had enjoyed strong military and *zaibatsu* connections as a member of the Mitsubishi concern and engaged exclusively in optical weaponry manufacture throughout the war. And it may have helped lay the foundation for the success of other industries that would develop out of Japan's own post-Occupation policy of export promotion (cf. Tsuru, 1996, pp. 77-87).

On December 10, 1950, Nikon received a letter from Major General W. F. Marquat congratulating it on its technological and commercial success in photographic lenses as reported in *The New York Times* (Nippon Kogaku KK, 1957, pp. 289; 291). Marquat wrote (p. 291):

> It has been my contention that Japanese export industry should adjust itself to compete in world markets on a basis of quality. It has been a firm conviction that Japanese industry is capable of doing this successfully and consequently it was most satisfying to learn that your company has justified this opinion. [...] The employees of Nippon Kogaku may take pride in making a substantial contribution toward the rebuilding of the economy of their country.

The popularity of Japanese cameras among Americans serving in Japan helped companies build their reputations and their brand names (which they did not change once they began to sell directly to the US market). When American military personnel returned to the US with their cameras, they created new demand for Japanese cameras, additional equipment and service. To take advantage of this new situation, in 1953, Nikon (followed by Canon and Minolta the following year) began exploring marketing and distribution

channels for their exports to the US (JCIA, 1987). In the early years of the Occupation, the PXs acted as a direct link to the US market without the cost to the firms of setting up export distribution or shipping the goods overseas. An open and expanding US market was, in effect, handed to the camera/lens companies. There can be little doubt that the PX exports encouraged the Japanese firms to believe that their products could succeed in the US market.

The impact of the Korean War

When the Korean War broke out, US military expenditure grew and Japan, where there were already base installations for the Occupation forces, was important for the provision of military supplies as well as for rest and recuperation of the troops. Procurement levels for the Korean War over the 1950-1954 period were significant, beginning at $149 million in 1950 and reaching a peak in 1952 of $824 million (Yamamura, 1967, p. 39). This suggests that the amount of US economic aid sent to Japan was more than doubled by US military expenditure between 1945 and 1955. The temporary nature of the situation created a sudden *tokujyu* (special demand of war) boomlet in the Japanese economy.[17] Much of the spending helped the expansion of Japanese industries, and was in line with US policy of the 1950s to make America's ally, Japan, into the economic and democratic showcase of Asia (cf. Tsuru, 1996).

The Korean War did a great deal to raise the international reputation of Japanese camera and lenses, especially those produced by Nikon and Canon. A pivotal event came in 1950 when a *Life* magazine photographer, David Douglas Duncan, fitted his two Leica IIIf cameras with a Nikkor 50 mm f/1.5 lens and a 135 mm f/3.5 lens (Lewis, 1991, p. 72).[18] His well-received book entitled *This is War!* included photographs taken with the Nikkor lenses. When Duncan divulged the fact that he had used lenses manufactured by Nikon,

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[17] Later, the Vietnam War had a similar effect (see chapter four).
[18] Nikkor is the brand name for Nikon's optical line.

photographers began to seek out Nikon factories and purchase lenses directly since they were scarce or simply not available in overseas markets. Not wanting to miss out on the opportunity, Canon began to invite photojournalists to test Canon's products in tough war circumstances, and they were equally well received.

How had Nikon and Canon come so far in such a short time? Canon's production facilities in Tokyo and Yamanashi Prefecture were largely intact in 1945 which allowed for a comparatively smooth re-entry into the market with civilian-use products (Canon, 1994). Nikon found themselves unable to provide optical goods to their customers (see above), but were able to recover after their supply problem was solved. Minolta suffered the loss of many of its production facilities and required more time to reorganize (Lewis, 1991). The vast numbers of skilled unemployed in the vacated textile region of Nagano Prefecture enticed camera companies to set up production there. This allowed them to take advantage of the highly dexterous textile workers (mostly female) who had lost their jobs to the changing economic conditions that had forced many textile companies abroad. The employees were valued for their ability to assemble quickly and carefully cameras and lenses, many of which contained thousands of parts. Still today, Nagano Prefecture is known for its strength in camera and lens production despite the fact that most camera manufacture and assembly has moved to East and Southeast Asia.[19]

One of the real problems of the Japanese domestic market was the lack of disposable income which could be spent on luxury items such as cameras and watches. Another was the excise taxes that were levied on luxury goods in order to control domestic demand and force most of the high-quality (and high value-added) goods overseas (see chapter four). However, the firms that exported cameras and lenses were few in number and generally large, and the demand for cameras was high. According to Miyabayashi (1963) and Lewis (1991), Japan went through a camera boom in the early 1950s attracting

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[19] This information is based on interviews with industrialists, Spring 1996.

numerous entrepreneurs into camera making. The industry blossomed and increasingly was composed of two types of manufacturers, those which were 'serious' and produced high-quality goods most of which were for export and those which sought to make a quick profit on domestic sales of shoddy goods.

By 1950, the leading companies were Nikon (which targeted professional photographers), Canon and Minolta. They were challenged by, among others, Konica Ricoh, Olympus, Yashica, Petri, Mamiya and Bronica. Asahi Optical, which was a top quality optics manufacturer at that time, did not begin to produce cameras until 1952, after which it took the brand name Pentax (Condax *et al*, 1984, p. 12). It was important for the Japanese firms to build a domestic market for their up-scale (exported) products since they needed healthy domestic sales to support the expanding export market (cf. Linder, 1961; Vernon, 1966). But, there were many camera makers — most were simple assemblers — with brand names covering the alphabet from A-Z, and the Japanese market was still quite small due to low income levels (JCII, 1984, p. 26; Lewis, 1991).

To compete, some companies offered innovative cameras with creative pricing (to minimize the effect of the excise tax) which proved to be very popular (Miyabayashi, 1963). One of the most successful cameras of this time was the Olympus Pen of 1959 which was reasonably priced at ¥6,800 ($19) and used half-frames of 35 mm film. In effect, half-frame cameras allow the user to get twice as many photographs out of one roll of film (see chapter one). Film was very expensive at that time in Japan due to limited supply of both domestic and imported film and to heavy excise taxes. Many photographers in Japan purchased film in bulk, cut it into lengths and rolled it into special re-usable and re-fillable cartridges as a money-saving measure. Recall that imported photographic film was tightly controlled and the sector was protected from foreign competition until the early 1970s (see chapters four and five).

The institutions of export promotion

In addition to measures taken by GHQ to stimulate the industry, the camera/lens companies themselves began to reorganize as early as 1946 reviving some prewar institutions, e.g. industry associations. In January of that year, 17 optical companies organized the Optical Instruments Conference which aimed to "improve cooperation among the manufacturers engaged in rebuilding the Japanese optical industry" (Lewis, 1991, p. 60). The name was then changed to Optical Instruments Manufacturers' Association (OIMA), and a camera division, established as part of the association, set up their office at Konica (then Konishiroku Photo Industry). The division members lobbied for reductions in excise taxes which they believed stifled domestic demand, and formed a technology committee to encourage technological development among the member companies. However, the OIMA was banned by GHQ on grounds the it encouraged anti-competitive behavior. It was reorganized as the Optical and Precision Instruments Manufacturers' Association in May 1948 and again banned, but the six divisions within the association, of which cameras was one, continued to work together (*Camerart*, January 1988).

In March 1949, the Export Product Control Act went into effect. All exported cameras, lenses and certain types of accessories were subject to inspection by designated officials from companies that had been members of the OIMA (*Camerart*, March 1990). Since the officials were OIMA members, export inspection worked as a self-regulation system. In April 1953, 13 camera manufacturers joined together to form the Photographic Industry Development Association (PIDA: *Shashinki Shinko Kogyokai*) with Kinji Moriyama, a young politician in the Progressive Party (*jiyu-to*) and later a powerful member of the Liberal Democratic Party (LDP), as its managing director (JCII, 1984). The PIDA's purpose was to promote the business of the member firms and solve problems that had arisen in the industry. This was done through committees on, e.g., distribution of cameras to the PXs,

reduction of the excise and other taxes, promotion activities, and market research (JCIA, 1987).

The following year the PIDA formed the Japan Camera Industry Association (JCIA: *Nihon Shashinki Kogyokai*), with Takeshi Mitarai, one of the founders of Canon, as its first president. The JCIA was one of six industry associations serving the optical instruments manufacturers organized under the re-established umbrella group, the Japan Optical and Precision Instruments Manufacturers' Association (*Nihon Kogaku Kogyo Kyokai*) (Sugi, 1971).[20] The specialized committees already established under PIDA's guidance became part of the JCIA. Industry associations, like the JCIA, are funded by membership dues.

Also in 1954, the industry received the explicit support of the Keidanren (the Federation of Japanese Industries that acts as the voice of business to government) when they submitted a report to the Japanese government entitled "The Export Promotion of the Optics Industry" (*Kogaku Kikai no Yushutsu Shinko*) (JCII, 1984, p. 559). Not long after its submission, specific measures were taken by industry and government to raise quality standards and promote exports of Japanese cameras and lenses. Rokuemon Sugiura 8th (1954), president of Konica and one of the most prominent figures in the photography industry at that time, published an article in the *Keidanren Geppo* (the Keidanren's monthly bulletin) expressing the importance of promoting the optics industry. Following his piece, is an article written by Keidanren officials (1954) entitled "Demands Regarding the Export Promotion of Optical Instruments," outlining why the industry was perfect for export promotion. Once the voices of the firms had been heard by the Japanese government, the PIDA, having fulfilled its mission, was dissolved in July 1955.

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[20] The others are Japan Motion Picture Equipment Industrial Association (*Nihon Eiga Kikai Kogyokai*), Japan Optical Measuring Instruments Manufacturers' Association (*Nihon Kogaku Sokuteiki Kogyokai*), Japan Surveying Instruments Manufacturers' Association (*Nihon Sokuryo Kiki Kogyokai*), Japan Telescope Manufacturers' Association (*Nihon Boenkyo Kogyokai*) and Japan Microscope Manufacturers' Association (*Nihon Kenbikyo Kogyokai*).

The photosensitive materials manufacturers (film and paper) were unable to act as quickly as the camera makers due to GHQ's deconcentration policy and hesitation about allowing them to reorganize immediately as civilian businesses. But after the shift in GHQ policy toward recovery in 1948-49, the film firms did begin to organize by forming the Photo Industry Conference (*Camerart*, January 1988). In 1953 the conference changed its name to the Photo-Sensitive Materials Industry Association (PSMA: *Shashin Kanko Zairyo Kogyokai*). Konica and Fuji Photo Film are members of both the JCIA and the PSMA since they manufacture cameras, lenses *and* film.

The main reasons that the industry was organized into associations and export inspection was begun was that by the mid-1950s the quality of all cameras, lenses and film had to be raised and the manufacturers of high-quality goods (which by that time were mainly the exporting firms) needed to build their domestic market shares.[21] At that time, the camera industry was booming and domestic demand was generally met by numerous small upstart camera makers, pejoratively referred to as '*yojohan* makers' (one-room apartment makers) (*Camerart*, April 1988). They were assemblers, not manufacturers, that bought up large quantities of cheap camera components and produced cheap cameras. They ran on such tight margins that they went into and out of business overnight. Generally, they did not possess the know-how to make optics and this distinguished them from the 'serious' firms, many of which exported the majority of their cameras/lenses (cf. Lewis, 1991).

The economic slow-down in 1953-54 following the end of the Korean War and the Occupation caused a rash of bankruptcies; the number of camera manufacturers fell by nearly one-third from 100 to about 65 firms (*Camerart*, February 1988; JCIA, 1987). The surviving firms became concerned that there was too much 'chaos' in the industry and therefore sought to strengthen their

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[21] In the case of film, the level of Japanese technology was considered to be below international standards. Thus, export promotion would have to wait until the firms could successfully compete, and until that time the market would be protected from imports.

industry and promote their businesses with the help of the PIDA, Kinji Moriyama and Keidanren as described above.

During the late 1940s and 1950s, the US and Japanese governments passed a number of laws regulating exports and industry standards with the aim of raising the quality of Japanese exports. The Export Regulation Act of 1948 (enforced again in 1949) allowed only those Japanese products that passed inspection to be exported. It was replaced by the Export Inspection Law (*Yushutsu Kensa ho*) of 1957.[22] In conjunction with the revised law, impartial third parties (i.e. not industry and not government) were created to carry out the inspections and to promote exports with the help of the respective industry associations (cf. JCII, 1984). The Japan Camera Inspection Institute (JCII: *Nihon Kogaku Kensa-kai*), established in 1954, had as its mandate to uphold the Export Inspection Law, the Electric Appliances Regulation Law (*Denki Yohin Torishimari ho*) and the Industrial Standards Law (*Kogyo Hyojunka ho*).[23] Moriyama became the president of the JCII, a post he retained until his untimely death in 1987.[24] At that time his wife, Mayumi Moriyama (a powerful LDP politician today) was named president (JCIA, 1987, pp. 18-19).

A cozy relationship developed very quickly between Kinji Moriyama, a politician who was also a camera enthusiast, and the leading photography companies in the early 1950s. Far too little research has been done on industry associations and export inspection bodies to be able to judge whether or not the photography industry was unusual in this regard. However, Yayama and Ito (1988, pp. 338-340) comment that while it is not unusual in Japan for an

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[22] The sources are not clear about what happened to the Export Product Control Act of March 1949, nor are they consistent regarding the names of specific laws (cf. *Camerart*, July 1988 and March 1990; JCII, 1984).

[23] The name changed to the Japan Camera and Optical Instruments Inspection and Testing Institute on May 1, 1973 when the institute's inspection responsibilities were expanded to include surveying instruments and biological microscopes (Lewis, 1991, p. 77). The acronym JCII remained the same.

[24] The activities of the JCII were originally directed toward the optics manufacturers rather than the camera makers, evidence of which can be seen in the use of the word 'optics' (*kogaku*) in its Japanese name rather than the word 'camera' (*shashinki*, later *kamera*). The discrepancy in the original Japanese and English names could be related to the origins of the major companies in optics technology and the export promotion of cameras.

industry to have a policy *zoku* (i.e. a politician with a particular industry specialty), Moriyama *was* different because he was a camera enthusiast. He took a very personal interest in the photography industry and did much more for the whole industry than a typical policy *zoku* would have done. Gerald Curtis (1988, pp. 115-116) notes that *zoku* "play an autonomous role" vis-à-vis bureaucrats and interest groups (e.g. industry) "trying to find areas of compromise between what interest groups want and what the government is prepared to give."[25]

The JCII served as a watchdog over the Japanese photography industry (JCII, 1984). In essence, it prevented companies that manufactured inferior goods from exporting and worked to establish a reputation for high-quality Japanese cameras and lenses overseas. The latter was what Nikon and Canon had already begun to do at the start of the decade. Over time, the JCII very effectively raised standards for all exports, and the inspection staff became expert on all technologies being developed in the industry. The JCII charged fees for the inspection and testing of each item exported, i.e. one percent of the item's value (cf. JCII, 1984). The proceeds financed the work of the JCII until 1989 when it was made defunct as part of the Japanese government's deregulation policy.[26] As the volume of photographic goods exports grew, and because the cost of performing the tests was kept low, the JCII became wealthy enough to construct its own 'JCII Building' in downtown Tokyo (Ichiban-cho) in 1960.[27]

Setting industry standards came as an outgrowth of the original mission of the JCII, that is, to inspect exported goods and thereby raise the quality standards of exported goods (JCII, 1984, pp. 233-251). The Institute began inspecting hand cameras in 1955 and quickly broadened its mandate all other photographic equipment. As camera and lens technology became more

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[25] Curtis (1988, p. 115) also comments that the definition of the term *zoku* has changed over time, and that it was not commonly used until the 1970s.
[26] The inspection activities of the JCII had already been minimized by this time because the firms had achieved and continued to maintain high standards on their own.
[27] This information is based on interviews with government officials, Spring 1996.

advanced, the inspection process became more complex. The Institute developed specific testing equipment which could determine, for example, average shutter speeds, degree of focusing capability, and precision of light meters, but much of the actual testing took place at the companies themselves. JCII inspectors made rounds to the factories randomly testing single pieces of export lots. Acting as an impartial third party, the JCII determined standards to which the all Japanese exporters of cameras and lenses had to comply. If firms did not abide by JCII standards, they could not export.[28] The export inspection law and the activities of the JCII to promote high-quality exports constituted industrial policy.

In the 1950s, the activities of the JCIA and the JCII were mainly directed toward promoting exports of Japanese cameras and lenses. In August 1955, Kinji and Mayumi Moriyama and three staff members of the JCIA traveled to New York City to set up the Japan Camera Information and Service Center which opened the following February (JCII, 1984, pp. 3-10).[29] Prior to the arrival of the JCII-JCIA group, Canon, Minolta, Nikon and Ricoh had, with varying degrees of success, begun to distribute their products in the US through local dealers (JCIA, 1987, pp. 19-20; JCII, 1984, pp. 14-22). The aim of the New York center was to assist the *whole* industry with camera repairs and marketing, especially the smaller firms with less capital to spend on developing export markets (Yayama and Ito, 1988, p. 333). The center provided information and repair service for *all* cameras made by Japanese companies, many of which had originally been purchased in PXs and were in need of repair. Again, the services provided by the JCIA and the JCII amounted to indirect industrial policy.

The New York center essentially allowed those companies which were exporting to the US (i.e. successfully passing the JCII inspections) to gain a

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[28] This information is based on interviews with JCII officials, Spring 1996.

[29] The JCIA staff members were: Takateri Koakimoto of Nikon, Toshiro Shimoyama of Olympus and Kojiro Sugawara, at that time president of Mamiya and vice president of the JCIA (*Camerart*, May 1988; JCII, 1984).

foothold in the US without all of the expense of arranging local marketing and distribution. In a sense, the inspection fees were used to defray the cost to each company of setting up its own offices and distribution networks in the US. Without the center's help to *all exporters,* the companies which had already begun to set up distribution networks might have gained an oligopolistic control of the whole US market. The center was originally sponsored by the Japanese government and by the JCIA member companies (see chapter four), and its initial was in the Japan External Trade Organization's (JETRO) offices. Five months after the New York center opened it moved to a separate location on New York City's prestigious Fifth Avenue.[30] JETRO also sponsored the first Japan camera show, one of the center's primary public relations activities to introduce new Japanese cameras on the US market (JCII, 1984).

In addition to the Japan camera center in New York City, a similar center specifically for repairs was established in Okinawa in 1956 to serve the needs of the US military personnel stationed there who had purchased Japanese cameras and lenses tax-free through the PXs (*Camerart*, May 1988).[31] The Okinawa PX comprised sizable sales to US military personnel who were mainly stationed in the Ryukyu Islands after 1952. In 1959, JCIA and MITI put up funds to investigate the potential for export promotion of cameras to markets in Europe. (JCIA, 1987; JCII, 1984, p. 133.) The JCIA member companies contributed 5 million yen and MITI matched it. Thus, 10 million yen was allocated to market surveys and PR for Japanese cameras. In 1963, Europe was far from one single market, therefore one information center was established in London and a second one was set up in West Germany.

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[30] JETRO is the export (and now import) arm of MITI, established by law (no. 95) as a public corporation on 26 April 1958. In 1954, MITI took over and expanded the operations of the predecessor of JETRO, or what had been export promotion bodies set up and financed by Kansai industrialists and prefectural chambers of commerce and local governments (Johnson, 1982, pp. 230-231). In 1954-55, a Fifth Avenue address must have been terribly expensive.

[31] The Okinawa center was called the Japan Camera Branch Office at Ryukyu, and it was closed in 1961 after the November 1960 US government order to the Ryukyu PX to defend the dollar and stop buying Japanese cameras.

Industry groups, e.g. the industry associations, with the support of the government played a crucial role in the early years of the photography industry in Japan because they helped lay the foundation for the industry's later expansion. The success of cameras was necessary for the success of the film; without cameras, people will not buy film. Interest in photography among ordinary Japanese was encouraged through journals devoted to photography, photography societies and by photography competitions. The latter were often sponsored by various associations or by prominent journals such as *Asahi Camera* which has been published since 1926 by Asahi Shimbun (Lewis, 1991, p. 37). The rise of leisure time, disposable incomes and tourism within Japan (and later in other countries) created a strong domestic demand for cameras, lenses and film and encouraged Japan's 'middle masses' to become avid photographers.[32]

The JCIA is always run by of one of presidents the 'big five' camera companies, i.e. Asahi Optical, Canon, Nikon, Minolta and Olympus. In the case of the PSMA, leadership shifts between the two largest comprehensive photography firms which manufacture cameras, lenses and film, i.e. Konica and Fuji Photo Film. The associations are closely linked with the government bureaucracy through the permanent staff of the PSMA and the JCIA who are essentially members of the bureaucracy. (This does not include company employees on secondment.) The job of the associations is to act as intermediaries between the government (primarily the Ministry of International Trade and Industry, MITI) and the companies. The government communicates its policy guidelines to firms through the associations and firms communicate their concerns to the bureaucracy through the same channel. The JCIA staff regularly report industry data to the appropriate section of MITI, currently the Machinery and Information Industries Bureau, Industrial Machinery Division.

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[32] Yasusuke Murakami (1987) refers to the expansion of Japan's middle class (i.e. most Japanese people) as the rise of Japan's 'middle masses.'

According to industry experts, this opportunity to exchange information was far more important in the early years than it is today.[33] One example is the production and engineering committee that was organized within the JCIA when it was founded (see above). In 1956, the committee transferred its activities to the Camera Engineering Research Association (CERA) which worked on developing camera lens performance and production technologies in cooperation with the Society of Applied Physics and a few other organizations (*Camerart*, May 1988: JCIA, 1987). The R&D was subsidized by MITI. Under a statute established in 1962 to encourage cooperative research among industries, CERA was reorganized as the Japan Optical Engineering Research Association. Most of the research centered on improving lens production and design, and working with national and international standards setting bodies, but its research agenda also included the "optical performance and function of human eyes" (*Camerart*, May 1988, p. 21). By 1981, research association's work was completed and it was dissolved. Firms no longer needed or wanted to exchange information through the research association. This is an example of how globalized the industry had become by the early 1980s.

The president of the JCIA is the chairmen of one of the big five companies, on secondment for a two or three-year term and working out of his own company. The members of the president's council are invariably the chairmen of the leading camera/lens firms, and because they have been meeting on a regular basis (about once a month) for years to discuss developments in the industry, they are all on quite friendly terms.[34] The industry associations in effect offer industry leaders a chance to come together informally to exchange information regarding the present state of the industry. This is why the APS consortium is so important. It created a rift between the chairmen of the firms within the consortium and those who were left out.

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[33] This information is based on interviews with JCIA officials, Fall 1994 and Spring 1996.
[34] This information is based on interviews with JCIA officials and industrialists, Spring 1996.

Conclusion

Until the APS consortium, Kodak dominated the global photography industry by controlling which film formats would become world standards. From the 1920s until the 1980s, Kodak took advantage of its position as the largest photographic film maker, at times forcing camera makers to withdraw products if they did not suit Kodak film formats (e.g. cameras introduced by Franke and Heidecke, Minolta and Nikon discussed above). The profit margins on photographic film are higher than on cameras and lenses, partly due to the fact that only a handful of firms supply film worldwide. There have historically been more firms in camera/lens manufacturing than in film, so competition has been more fierce.

Since the 1980s, Kodak's position as the world's leading photography firm has been eroded. It is still the leader, but several Japanese firms have grown in relative strength in international markets. The APS consortium means that film is no longer the only product that determines film formats. Now, the camera/lens makers also influence them. The three camera/lens firms, i.e. Canon, Nikon and Minolta, are therefore much stronger vis-à-vis Kodak than they have ever been in the past. The APS consortium also cuts across national borders. It is a sign that Fuji Photo Film is a necessary partner for Kodak and that they both now share the global market for photographic film.

As described in this chapter, the Japanese economy was set on a course of export promotion during the latter half of the Allied Occupation, i.e. 1949-1952. Japan's economic recovery was based on promoting exports that generated foreign exchange (e.g. cameras, lenses and film) to correct Japan's balance of payments which until the Korean War boom relied on subsidies from the US government. At first ,the US market was opened up to Japanese goods such as cameras/lenses to cut Japan's dependence on US subsidies, but

as the Cold War intensified, Japan's economic recovery became part of America's foreign policy in East Asia.

To support export promotion of cameras, lenses and film, the government and industry cooperated by setting up the JCIA, the PSMA, the JCII and research associations. The general atmosphere in Japan in the early 1950s was either export or die; the seven leading Japanese photography firms today became successful as exporters. The leading firms cooperated with the government through the industry associations *and* they developed a cozy relationship with Kinji Moriyama, a *zoku* politician, who promoted the exports of Japanese cameras and lenses and helped set up the JCII. The industry associations played an important role in the photography industry as discussion fora for the chairmen of the top firms. However, when the APS consortium was formed, only four of the seven top Japanese firms were invited to participate. Consequently, discussions at industry association meetings became less frank, and rivalry among the firms intensified.

Chapters four and five show that there was a substantial degree of government-industry cooperation from 1950 to the early 1970s, and that from 1974, industry relationships was characterized more by rivalry. In the early period, many firms enjoyed the benefits of Japan's export promotion industrial policy, but this did not apply to all. Many firms were allowed to fail. Exporting firms cooperated with bureaucrats and with Moriyama to raise the whole industry to international levels of competition. By the 1980s, rivalry among the relatively few firms in the global photography industry rose. Firms were no longer 'Japanese' or 'American' or 'West German,' but were known by the reputations of their products. Many Japanese photography firms changed their company names to their brand names because that is how they are recognized internationally. How the relationships among bureaucrats, politicians and firms in the Japanese photography industry shifted over time from more cooperation/less rivalry to more rivalry/less cooperation is the subject of the next two chapters.

4. The Heyday of Export Promotion

Introduction

This chapter analyzes how growth in the photography industry was sustained and its international competitiveness was increased from 1950 to the first oil crisis. This period covers the rise of export promotion as a conscious economic policy in Japan and how US economic and strategic policy worked to encourage its success. The photography industry, targeted as one of Japan's recovery industries, shows just how successful export promotion came to be by the early 1970s. The next chapter picks up the story from 1974 when protectionism in the Japanese market was being dismantled and export promotion became no longer viable because Japan was no longer a nation in economic recovery. The early 1970s was also when international competition among firms began to take on a new character as the postwar economic expansion wound down. The trend toward globalization was influenced by the international financial system which entered a new phase in the early 1970s, after the breakdown of the postwar system based on the gold standard.

The 1950 to 1973 period is mainly characterized by *cooperation* rather than rivalry among the politicians, bureaucrats and businessmen involved in the postwar recovery of the Japanese photography industry. Rivalry existed as well, but cooperation tended to dominate. As described in chapter three, by the mid-1950s, the industry gained the sponsorship of a *zoku* politician, Kinji Moriyama, and several industry associations were established to help with export promotion. Many photography firms introduced successful but inexpensive cameras and lenses in their effort to challenge the West Germans who led the world in camera/lens technology in 1950.

The firms that were best able to develop new products and implement new manufacturing processes were those that began to export through the US military post exchanges (PXs). After 1949 when export promotion went into effect as an economic recovery policy, the photography industry began to expand very rapidly. The Japanese government controlled export revenues and allowed exporters to retain some earnings while the rest was channeled into other industries that had been targeted for export growth. The photography firms took advantage of tax incentives to invest in plant and equipment, and by the end of the 1960s held a very strong — perhaps the strongest — position in cameras and lenses in world markets.

How did the Japanese photography firms pull ahead of their competitors particularly in West Germany, and why were their competitors unable to respond effectively? First, the United States became *the* most important export market for Japanese cameras and lenses, which were manufactured by a handful of leading photography firms (e.g. Asahi Optical, Canon, Mamiya, Minolta, Nikon, Olympus, Ricoh and Yashica) and the two makers of photographic film (i.e. Fuji Photo Film, Konica). As described in chapters two and three, not only was the US market open to Japanese exports because of Japan's balance of payments problems, but by the early 1950s Japanese cameras and lenses had also made considerable inroads into the US market through PX sales to the US armed forces stationed in Japan and East Asia.

Second, domestic sales of photographic goods were discouraged throughout the 1950s by government controls on the supply of goods to the market and because of substantial excise taxes. This was partly to keep inflation under control but it was also partly due to Japan's export promotion policy. The Japanese government prioritized export industries with high foreign exchange earning ratios, including the photography industry. The exporters that produced more expensive cameras and lenses benefited in terms of growing export sales, but their share of the domestic market was

small. Demand in the domestic market was mainly satisfied through sales of lower-cost cameras and lenses and domestically-made photographic film. Imports were kept at low levels due to quotas but these were gradually replaced by import tariffs.

Although the domestic market was important in the 1950s, it did not really begin to expand until the excise taxes were lowered in the early 1960s. And it was only when prices were lowered that average Japanese consumers began to purchase higher priced cameras/lenses in greater quantities. The firms that made these cameras benefited at first from Japan's industrial policy for export promotion and later domestic market expansion. However, demand in Japan was quickly satisfied and by the mid-1960s, the industry faced problems of overcapacity and price gouging. The 12 leading member firms of the Japan Camera Industry Association (JCIA), i.e. the main exporters, set up a recession cartel to mitigate the effects of 'excess competition.'[1] Once again, the exporting firms in the photography industry benefited from Japan's industrial policy.

Third, the exporters turned their attention to the overseas market with a new wave of exports directed at building the European market *and* expanding their dominance in the US market. Exports took off on a massive scale aided by innovations in mass production of cameras/lenses and by a large variety of new products that emphasized automatic rather than mechanical controls. By the early 1960s, Japanese camera/lens exporters controlled a larger share of the US market than their German rivals. And by the end of the decade, they had repeated this performance in the European market, beating the West German firms in the battle for world market shares of cameras/lenses. Industrial policies that had encouraged firms to expand capacity and promote exports reached their heyday throughout the postwar period up to the early 1970s.

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[1] See chapter two for a discussion of 'excess competition.'

Finally, while cameras and lenses were promoted as foreign exchange-earning exports, the production of photographic film in Japan was protected from international competition through import quotas, tariffs and various controls, e.g. on foreign direct investment. Konica and Fuji Photo Film, two of the photographic film manufacturers, were also top makers of cameras and lenses. Therefore, they benefited from Japan's industrial policies which promoted exports of cameras/lenses *and* protected the market from imports of photographic film. Konica and Fuji Photo Film dominated the Japanese market because they are the only Japanese makers of photographic film to also export cameras/lenses. The two firms took part in an export promotion campaign similar to the industrial policy that had worked so well with cameras/lenses. By the early 1970s, their efforts had met with only limited success because international conditions (including access to the US market) had changed. Another factor is that the photographic film industry is characterized by high technological barriers to entry and high costs of production. Significant investment is required in technology, manufacturing equipment and manufacturing processes before economies of scale can be attained.

Technological change and market access in the US and Europe helped shape the industry from 1950 to 1973. On the supply side, photography firms introduced hundreds of new camera and lens models and kept production costs down through mass production. Retail prices of exports remained low throughout the period due to a favorable exchange rate. Tax measures encouraged firms to invest in new manufacturing equipment which allowed firms to continue to raise production volumes and their technological levels. Also of particular relevance to this chapter is how *cooperation* — with rivalry at times — developed among bureaucrats, politicians and firms in the Japanese photography industry. Throughout the period, rivalry was also important. Firms responded to changing circumstances in the Japanese market and in overseas markets according to their profitability, overall strategies and their

performance relative to other leading firms. But government 'guidance' and cooperation – especially with the help of the industry associations – were important to the success of the photography exporters during the 1950 to 1973 period.

Taking the US market

In the early years of the Allied Occupation of Japan, sales of cameras and lenses through the post exchanges (PXs) were important for developing the United States as Japan's primary export market (see chapter three).[2] As previously mentioned, this was closely linked to the General Headquarters' (GHQ) (of the Occupation) policy of cutting Japan's dependence on US aid by bringing in foreign exchange to pay for needed imports. PX sales were very important for the exporting photography firms because they got their products – and their brand names – into the US market through US military personnel who returned home. When their cameras needed repair or when they wanted to purchase new Japanese cameras and lenses, the Japan Camera Information and Service Center in New York City (opened in February 1956) was there to help. Furthermore, cameras sold through the PXs were much cheaper than prices in the domestic market in the early 1950s. The Nikon M with an f/2 50 mm lens sold for $65 in the PXs but for twice that amount in Japanese retail stores (ca. ¥50,000) due to a 60 percent excise tax on all cameras sold in Japan. Average monthly wages were roughly one-tenth of the price of a Nikon M (*Camerart*, March 1990).

When PX sales fell off due at the end of the Occupation (in 1952) and after the conclusion of the Korean War (1953), 'regular' exports (i.e. not PX 'exports') of Japanese cameras and lenses to the US took off. In 1954, PX sales to the US armed forces were roughly equal to 'regular' exports, but they

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[2] During the Occupation, Japanese 'exports' were sold through the Central Post Office at the post exchanges (DoC, 1959; JCII, 1984, p. 26).

decreased thereafter (DoC, 1959, p. 6). Buoyed by the success of the Japan camera shows, as well as the information, service and market surveys sponsored by the New York center, exports of cameras to the US reached their first postwar peak in 1957 at 2.5 billion yen ($6.9 million) (Seki *et al*, 1961, p. 83). A similar center to that in New York was established in Okinawa in 1956 to service all cameras used by the US forces, not only those made in Japan (JCII, 1984, pp. 70-71). Other export markets (e.g. to Canada, Hong Kong, West Germany, Switzerland and the UK) grew as well, but not as quickly as the American one (Seki *et al*, 1961).

Japanese photographic lenses, especially those produced by Nikon and Canon, achieved very early acclaim due to their high-quality workmanship and internationally-competitive technology. The *New York Times* reported in 1950 that the best Japanese lenses were equal or superior to the top West German models in quality, and in some cases their focusing performance was better (*Camerart*, March 1990; Lewis, 1991, p. 72). Japanese cameras also began to gain a strong international reputation through innovations, such as the instant-return mirror developed by Asahi Optical (maker of the Pentax brand) for their Asahiflex IIB (see chapter one). Convenient, high quality and inexpensive cameras, such as the Canonet introduced by Canon in 1961, also helped combat the image that Japanese cameras were merely 'toys,' i.e. not cameras for serious photographers, or were poorly made. The perception in the US and Europe of Japanese goods being inferior in quality, performance and design dogged the industry throughout the 1950s and 1960s.

The New York center's campaign to provide information and repairs for Japanese cameras and lenses to US customers and to supply market information to the exporting firms proved highly successful. In terms of export value, cameras trailed only radios and sewing machines over the 1950 to 1959 period, from the total of eleven exported durable goods shown in table 4.1. Looking at the same table, Japanese exports of cameras grew from 5.4 percent of the world market (value) in 1950 to 37.2 percent by the end of the

Table 4.1 Japan's Exports of Durable Consumer Goods, 1950-1959 and as a Percent of Total World Trade, 1950 and 1958 (value: $US million, percent)

	Cameras	*Sewing Machines*	*Radios*	*Bicycles*	*Phono-graphs*	*Motor-cycles*	*Televisions*	*Watches*	*Washing Machines*	*Vacuum Cleaners*	*Refrig-erators*	*Passenger Cars*	*Other*	*Total Value*
1950	1.0	9.5	0.1	5.3	0.3	0.1	...	1.0	...	...	...	...	17.3	17.3
1955	7.8	38.7	0.9	8.5	0.7	0.6	...	1.7	...	...	...	0.7	59.5	60.2
1958	23.4	47.4	33.0	6.8	2.2	1.8	0.9	1.6	0.2	*	0.3	4.8	120.1	124.9
1959	31.2	57.9	104.3	10.6	4.8	5.0	2.1	2.4	0.3	0.1	0.9	7.7	222.7	230.4
1950	5.4	15.3	0.1	5.5	1.6	0.2	...	0.5	...	...	...	...	2.7	1.3
1958	37.2	40.5	16.7	7.4	2.2	1.8	1.0	0.5	0.4	0.4	0.2	0.2	8.2	3.5

Note: * US$ 30,000.

Source: A. Miyabayashi (1963) "Japanese Camera Exports to the United States: A Case Study in Development and Competition," MBA Thesis, City University of New York, June, p. 36, based on Fiscal Year 1960 Economic White Paper as cited in M. Seki *et al* (1961) *Kamera Fuirumu* (Camera and Film) Tokyo, Yugenkaku, p. 81.

decade. Japanese camera/lens exporters steadily increased their production and exports during the decade.

At first, Japanese firms filled US demand for low-cost cameras, especially cameras valued at less than $10, while West German firms supplied the higher-cost categories. As table 4.2 shows, the volume of Japanese exports (not including PX sales) rose by more than 250 percent when the center was opened in New York from just over 330 thousand units in 1954 to slightly more than 868 thousand units in 1955. By the middle of the decade, Japanese firms were beginning to establish themselves as competitors to the West German manufacturers in the high end of the market. Leading Japanese exporters, e.g. Nikon. Minolta and Canon, exported more advanced cameras and lenses and they undercut the West German firms in price.

A report for the US Department of Commerce Business and Defense Services Administration (DoC, 1959, p. 11) noted that during the 1950s, there was "a very noticeable shift ... to cameras [imported from Japan] valued at more than $10 each." The Department of Commerce data (1959, p. 30, Table 14; and 1964, p. 33, Table 23) indicates that the ratio of Japanese cameras (quantity) to total US imported cameras valued at more than $10 each rose from 4 percent in 1954 to 69 percent in 1963. The same ratios for West German imports to total US imports (in the same category, i.e. cameras valued at more than $10 each) show a drop from 80 to 29 percent over the same period. By the end of the 1950s, Japanese exporters of cameras/lenses were taking sales of higher-cost cameras away from their West German rivals in the US market.

Japanese firms dominated the US market for cameras/lenses by 1962, selling about four times as many cameras there as the West German firms. One of their advantages was the very favorable yen-dollar exchange rate (unchanged since 1949). In 1962, for example, the total value of Japan's exports in US dollars was roughly equal to the total value West Germany's exports which represented only one quarter of Japan's volume (see table 4.2). Per unit price rose from roughly $1.30 to $13 per Japanese still camera imported into

Table 4.2 United States Imports of Still Cameras, Total, from West Germany, and from Japan, 1950-1963 (number: thousands, value: thousand US dollars and percent of total)

	Total	*Total*	*From West Germany*				*From Japan*			
	Number	*Value*	*Number*	*Percent*	*Value*	*Percent*	*Number*	*Percent*	*Value*	*Percent*
1950	225.4	4,137.3	131.9	58.5	3,638.0	87.9	85.1	37.7	111.0	2.7
1951	341.6	6,484.1	214.7	62.8	5,742.2	88.6	111.0	32.5	342.6	5.3
1952	484.0	9,900.4	342.7	70.8	7,119.7	71.9	78.2	16.2	579.2	5.9
1953	922.3	10,327.8	373.2	40.5	7,433.0	72.0	137.3	14.9	556.8	5.4
1954	733.7	9,681.9	228.7	31.2	6,662.1	68.8	332.6	45.3	372.6	3.8
1955	1,274.6	12,446.0	334.7	26.3	8,397.5	67.5	868.3	68.1	1,465.5	11.8
1956	1,139.3	15,783.9	255.9	22.5	9,025.8	57.2	819.4	71.9	3,205.4	20.3
1957	1,385.3	19,040.1	231.7	16.7	9,505.9	49.9	1,098.7	79.3	6,731.0	35.4
1958	1,132.3	18,598.0	249.5	22.0	10,048.4	54.0	778.4	68.7	5,907.7	31.8
1959	1,435.1	20,475.5	344.3	24.0	11,510.3	56.2	997.4	69.5	6,565.8	32.1
1960	1,562.3	17,986.3	256.9	16.4	11,870.9	66.0	894.4	57.3	7,394.8	41.1
1961	862.7	18,826.7	151.4	17.5	9,177.8	48.7	660.3	76.5	7,764.3	41.2
1962	1,400.2	23,217.3	198.3	14.2	10,974.7	47.3	812.8	58.0	10,587.7	45.6
1963	1,287.8	19,824.2	144.2	11.2	7,865.4	39.7	875.1	68.0	10,682.7	53.9

Source: A. Miyabayashi (1963) "Japanese Camera Exports to the United States: A Case Study in Development and Competition," MBA Thesis, City University of New York, June, p. 112, based on Department of Commerce (US) data for 1954-1961 and statistics compiled by A. Wolfman, 1961-62; and DoC (1964) "United States Foreign Trade in Photographic Goods, 1963," Washington, DC, Business & Defense Services Administration, p. 33.

the US and from approximately $28 to $55 per West German still camera imported into the US over the 1950 to 1962 period.[3] The rapid success of Japanese cameras and lenses in the US was challenged in Washington D.C. by a camera lobby, but it was unsuccessful because the imbalance of US-Japan trade was seen as more important (Yayama and Ito, 1988, p. 334). The secret to the industry's success, according to Yayama and Ito (1988), Kinji Moriyama's biographers, was the fact that the Americans encouraged Japanese camera imports into the US market because Japan's economic recovery took priority over all else.

Despite their success in the US market, Japanese cameras/lenses suffered from a popular perception of poor quality and workmanship relative to comparable West German goods. In 1952, when Canon wanted to set up its US distribution through Bell & Howell Co., their response was, "'Made-in-Japan' means cheap and shoddy goods here" (Miyabayashi, 1963, p. 115).[4] It took 10 years for the deal to finally go through. According to industry specialists, the long-term success of the industry depended on establishing a positive image in the US and Europe for Japanese cameras and lenses and on building trust among customers.[5] One of the urgent tasks of the New York center was to provide information that would satisfy the public's curiosity about the new Japanese cameras. Another was to reassure customers that should anything go wrong with their Japanese cameras, they could turn to the center for help and repairs. But even a decade after the Korean War (when professional photographers had scrambled to get their hands on Nikon lenses for their Leica cameras), the image of cheap Japanese products persisted.

Eastman Kodak expressed concern about this problem because at this time the firm had a purchasing arrangement with Chinon (a Japanese firm in which Kodak purchased a majority share in 1997) (Yayama and Ito, 1988, p. 337). Kodak wanted to be assured that Chinon's products were of consistently

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[3] This is a straight calculation without reference to actual sales prices or still camera type.
[4] Miyabayashi (1963) quotes *The Japan Times*, November 30, 1961.
[5] Information based on interviews with industrialists and JCII officials, Spring 1996.

high quality. The Japan Camera Inspection Institute (JCII), established in 1954, worked to insure that all exported Japanese cameras and lenses were of high quality. Although the quality standards of exported cameras/lenses continued rise throughout the 1950s, perceptions were slow to change. Compounding the problem, were charges lodged by Franke and Heidecke that Yashica produced a camera (i.e. their Yashica 44) that was a copy of their Rolleiflex 4 x 4 (Lewis, 1991, p. 98). Yayama and Ito (1988) note that before WWII, the name Nikon (pronounced 'knee-con' in Japanese) was criticized by Zeiss Ikon of Germany for sounding too much like Ikon, part of the firm's name, and Ikonta, one of its camera brands. The problem of firms that copied famous brands was not confined to the Japanese photography industry. Therefore, in 1959, the Japanese government passed the Export Design Law and established the Japan Machinery Design Center (JMDC) (Lewis, 1991). The JMDC's role was to encourage Japanese firms to come up with their own innovative product designs.

In the photography industry, the JCII in cooperation with the JMDC decided to create a seal of approval that would be affixed to every exported camera and lens. On January 1, 1960, they implemented the now famous oval-shaped, black and gold 'Passed' sticker which carried the JCII *and* the JMDC logos (JCIA, 1987, p. 31). The seal meant that every exported item was properly inspected and tested *and* was an independent Japanese design. The US government insisted at about the same time that all Japanese lenses imported into the US carry the words "Lens Made in Japan" to insure the country of origin was clear (JCII, 1984, p. 131).

Recall that the information and service center in New York City was established by the JCIA and the JCII to act as a 'bridgehead' in the US for Japanese exporters of cameras/lenses and provide marketing and distribution functions. By 1960, these services were generally no longer needed. Each exporter had begun to build its own marketing and distribution, and it became clear that the purpose of the center would have to change. Until 1961, the

center's director was seconded from one of the exporting firms, but the fifth director sent that year to New York was a government official. Heightened competition among the Japanese exporters also meant that the practice of seconding company employees to work at the center as camera specialists and technicians able to handle all makes and models had to change (JCII, 1984, pp. 149-150). Instead of abolishing the New York center because exporting firms no longer depended as heavily on its services, the Japanese government took over the staffing responsibilities. Arguably, the government found it useful to do so because it increased their ability to exercise control in the US over the rapidly expanding Japanese camera/lens exporters.

In the US, the total budget (¥43.7 million or $121 thousand) of the New York center was originally composed of both public and private sector funds (JCII, 1984, p. 5). The public funds, both controlled by MITI, were the bicycle racing funds (*keirin shikin*) at ¥20 million ($56 thousand) and the banana funds at ¥10 million ($27 thousand). The latter came from the difference between the import price of bananas and the sales revenue. The MITI money was used specifically to foster industries considered important for the nation by covering, for example, export promotion expenses (JCII, 1984, pp. 5-6; Johnson, 1978, pp. 47, 156). The JCIA member companies contributed the remaining ¥13.7 million ($38 thousand). The banana import funds were not supplied in fiscal year 1956, and the other two sources of funding were increased by roughly ¥10 million each (JCII, 1984, p. 79). From fiscal year 1957, the JCIA member companies began to provide twice the amount of MITI's bicycle racing funds, bringing the total budget to ¥45 million ($125 thousand) (JCII, 1984, p. 92). The photography industry received MITI's banana and bicycle racing funds because it was targeted as an export promotion industry.

In 1962, the New York center faced a serious problem. Only about ¥12 million ($33 thousand), or about enough to cover the annual salary of one employee, would be covered by JCIA member company contributions (JCII, 1984, p. 149). That was the equivalent of about one-quarter of the expected

budget, and the rest was to come from by MITI's bicycle racing funds as in previous years. However, that year, help from MITI was not forthcoming. MITI used the argument of the changing needs of the photography industry and the fact that civil servants were now staffing the New York center as a rationale for not supplying the needed funds.

The real reason, according to the JCII, was MITI's plan — kept secret from the photography firms — to establish its own centers for Japan's light machinery exporters (e.g. electronic goods, cameras and sewing machines). In October 1963, MITI organized Japan's light machinery industry into three regions, i.e. Europe, North America and Southeast Asia, for export promotion (JCIA, 1987; JCII, 1984, pp. 156-158). Four centers were established the following year in London, Dusseldorf, New York and Bangkok.[6] The fact that MITI used the changed circumstances in the camera industry to its advantage and was not forthright about its plans indicated the relative weight of the camera industry in Japan's industrial policy for export promotion. Akio Miyabayashi commented in 1963 (p. 6), "The Japanese camera industry is the prime example of success in turning out a precision, quality product for the world market. It remains for other industries to do likewise in order for Japan to meet her foreign exchange requirements." MITI's new centers probably reflected its attempt to repeat what the camera industry had done so well, i.e. providing industry-wide information and service for export goods expressly for the purpose of expanding world market shares.

From a financial viewpoint, it was surely more cost effective for MITI to finance four regional centers than to provide subsidies (through the banana and bicycle racing funds) to numerous, individual centers run by industry associations. Fewer centers also meant more control for MITI, and control was what MITI wanted in the early 1960s, when the government continued to lose

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[6] The diversity of the European markets is illustrated by the establishment of two Light Machinery Centers there, one in London and the other in Dusseldorf. But it may have been influenced by the fact that the JCIA and MITI financed surveys of the European markets in 1959 (costing them ¥5 million or $14 thousand each) to investigate the prospects for export promotion of cameras and lenses based in those cities (JCII, 1984, p. 149).

power to e.g. allocate imports, approve technology imports and joint ventures with foreign firms due to the process of trade and capital liberalization (Tsuruta, 1988, pp. 54-55). Maintaining control over the exporters became more important than export promotion which was what had allowed firms, such as Canon and Ricoh, to expand so quickly (see appendix 4a). It can be surmised that MITI needed the camera industry's credibility more than the industry needed MITI's funds to continue the services provided by the New York center. According to Moriyama (JCII, 1984, pp. 150-151), "there left absolutely no room for doubt about the true influence of the global Japanese camera industry."

By 1960, Japanese camera/lens manufacturers were dependent on the US market for over 40 percent of their total sales in value terms (see table 4.2). This meant that they were vulnerable to fluctuations in US demand and to US political moods. In the early 1960s, for example, domestic pressures in the US led to restrictions on the sale of foreign goods in PXs and caused a sharp decline from $3.9 million to $1.3 million between 1960 and 1961 in Japanese camera sales (DoC, 1962, p. 2).[7] The Vietnam War and the new influx of US troops however raised purchases at PXs again such that by 1966 over 10 percent of total Japanese camera exports went to Vietnam (JCII, 1984, table on p. 190). A peak was reached the following year at 19.4 percent. Like the Korean War, the Vietnam War had a positive effect on Japanese camera/lens sales to US forces stationed in East Asia. Concern among Japanese firms over excessive dependence on exports to the US market and on sales through US PXs was high. By 1959, many of them turned their attention to Europe (JCII, 1984, p. 133) as discussed in more detail below. First, however, Japan's domestic market situation is discussed.

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[7] The figures quoted here (DoC, 1962, p. 2) do not match what is listed in Table 4 (p. 5) of the same document which shows $3.1 million and $1.5 million respectively.

Japan's domestic market woes

Because camera and lens exports were an integral part of Japan's economic recovery based on export promotion, domestic demand was stifled throughout the 1940s and 1950s by relatively high excise taxes on cameras and sensitized materials (see table 4.3). Prior to the end of WWII, the excise taxes on these goods were raised to 120 percent to discourage all unnecessary civilian purchases. This message was echoed by GHQ policy until Japan's economic recovery became a priority after 1948. Excise taxes were lowered then to 80 percent for still and motion picture cameras and 50 percent for sensitized materials (i.e. film and paper). In 1950 and again in 1951, the excise on cameras was lowered but only to 60 and then 40 percent while the excise on sensitized materials dropped to 30 percent.

Kinji Moriyama was a Japanese politician who took part in what was called 'camera mania' in the early 1950s, that is, the growing popularity among Japanese of cameras and photography in general.[8] He became aware that one of the problems causing sluggish sales of cameras/lenses — especially higher-quality cameras/lenses — in the Japanese market was high excise taxes. Six months after Moriyama began to look into the problem (in 1953), the excise on cameras was lowered to 30 percent, bringing it to the same level as the excise on sensitized materials (JCII, 1984, pp. 28-30). The next reduction did not come until 1962 when the excise tax on cameras was lowered to 20 percent. Domestic shipments of still cameras (i.e. all types of cameras except for motion picture cameras) rose quickly thereafter (see graph 4.1). The excise on black and white sensitized materials dropped to 10 percent in 1962 while it remained at 20 percent on color film (see below).

As described above, Japanese camera/lenses exporters became heavily dependent on the US market for a large portion of their sales. Domestic sales

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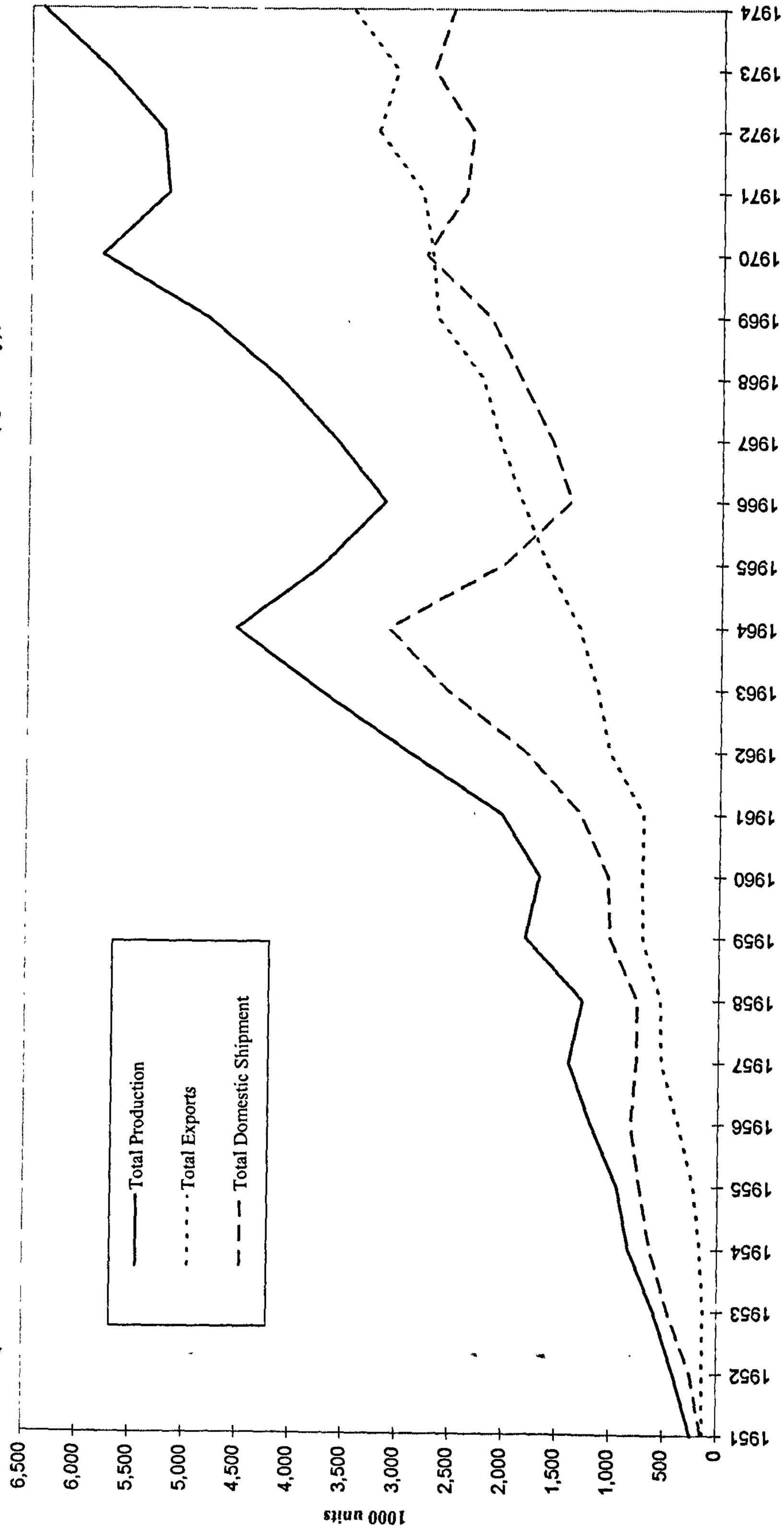
[8] Moriyama was a member of the Progressive Party (*jiyu-to*) until 1955 when the party became part of the newly-formed Liberal Democratic Party.

Table 4.3 Japan's Excise Taxes on Photographic Goods, 1937-1966[a] (percent)

Date of Reduction or Increase	*Cameras*[b]	*B&W Film & Paper*[c]	*Color Film & Paper*[c,d]
August 1937	20	20	20
March 1938	15	15	15
March 1940	20	20	20
November 1941	50	50	50
January 1943	80	80	80
February 1944	120	120	120
September 1946	100	100	100
January 1947	100	80	80
September 1948	80	50	50
January 1950	60	50	50
January 1951	40	30	30
June 1953	30	30	30
April 1962	20	10	20
April 1966	15	15	15

Notes: [a] All excise taxes were abolished in February 1989.
[b] Includes still and motion picture cameras.
[c] Includes cine film.
[d] In 1962, includes all types of dry plates, sheet film and sensitized paper. Color print paper carried a 25 percent tax.

Sources: JCII (1984) *Sekai no Nihon Kamera*, Tokyo, JCII, pp. 557-579; JCIA (1987) *Nihon Kamera Kogyo-shi*, Tokyo, JCIA, pp. 292-314; G. Lewis (1991) *The History of the Japanese Camera*, Tokyo/Rochester, NY, JCII & IMP/GEH, p. 58; JCIA (1994) *Nihon Kamera Kogyo 10-nen no Ayumi, 1984-1993*, Tokyo, JCIA, p. 36.



Graph 4.1 Japan's Total Production, Exports and Domestic Shipment of Still Cameras (Quantity), 1951-1974

Figures are from JCIA statistics and include those produced by overseas subsidiaries of JCIA member companies.
Source: JCIA (1987) *Nihon Kamera Kogyo-shi* (The History of the Japanese Camera Industry), Tokyo, JCIA, p. 374.

remained somewhat limited due to the high excise taxes, and as discussed in chapter three, there were many small firms that did not export and filled the demand in Japan for inexpensive cameras. In the early 1950s, the most popular cameras were the folding camera and the twin-lens reflex camera. Folding cameras were popular in Japan because they were inexpensive; the expensive models, such as the rangefinder and single-lens reflex (SLR) models, were sold mainly in the PXs. At that time, the more expensive folding cameras with rangefinders cost roughly ¥20,000 ($56) while 35 mm rangefinder cameras cost more than three times that amount, from roughly ¥50,000 to ¥70,000 ($139 to $194) (*Camerart*, February 1990). Most Japanese twin-lens reflex cameras were imitations of the popular German Rolleiflex, and very few were exported. Japanese camera/lens exporters worked hard to improve the quality and technological level of their products and to create original designs, but the higher-priced cameras (mostly 35mm cameras) did not sell well domestically until the excise taxes were lowered in the early 1960s. Cheaper cameras were widely available on the Japanese market throughout the 1950s and they satisfied local demand.

Quantitative restrictions on the import of cameras, black and white film, sensitized paper and photographic plates also limited the selection of goods for amateur and professional photographers in Japan (DoC, 1962, p. 2). Some of the quantitative restrictions were lifted in 1961 (i.e. on cameras, projectors and other photographic equipment except 16 mm movie projectors), and sensitized materials (i.e. film and paper) quotas were lifted the following year. Color film remained under quota until 1971 (see chapter five for details). Once the excise tax was lifted, sales of imported cameras showed a marked increase (DoC, 1962). Fiscal year 1962 statistics indicate that the domestic market expanded faster than the export market (at 40 vs. 30 percent) during 1961 and the trend continued until 1965 when exports grew faster than domestic sales (JCII, 1984, p. 124) (see also graph 4.1). The lack of a thriving domestic market for 35 mm cameras prior to 1961 and the inherent danger of

the leading photography firms (i.e. the exporting photography firms) relying too heavily on export sales surely helped Moriyama in his efforts to lower excise taxes.

Leading exporters (e.g. Canon, Konica, Minolta, Nikon and Olympus) produced cameras/lenses far more cheaply than their West German competitors, and expanded their world market shares throughout the 1960s by introducing new, innovative products at affordable prices. Olympus introduced their popular half-frame Pen camera in 1959 at price of ¥6,800 (ca. $19) which used half as much film as a regular 35mm camera (see chapter one) and enjoyed tremendous popularity in Japan throughout the 1960s.

Canon introduced its mid-priced Canonet, produced at high volumes and low cost (sales price: 19,800 yen or $55), in 1961. Canon was criticized by the other 43 JCIA member firms because the Canonet's retail price "was in violation of the manufacturers' agreement to fix prices industry wide" which had gone in effect in October 1959 (Lewis, 1991, pp. 104-105, 108). Competition among the JCIA member firms intensified throughout the 1950s such that between 1957 and 1961 ten firms declared bankruptcy. Part of the problem was an incessant proliferation of new camera models and aggressive retail price cuts. In addition to fixing prices, the 44 firms agreed to bi-annual product introductions at the Japan Camera Shows beginning in March 1960 (Lewis, 1991, pp. 104-105).

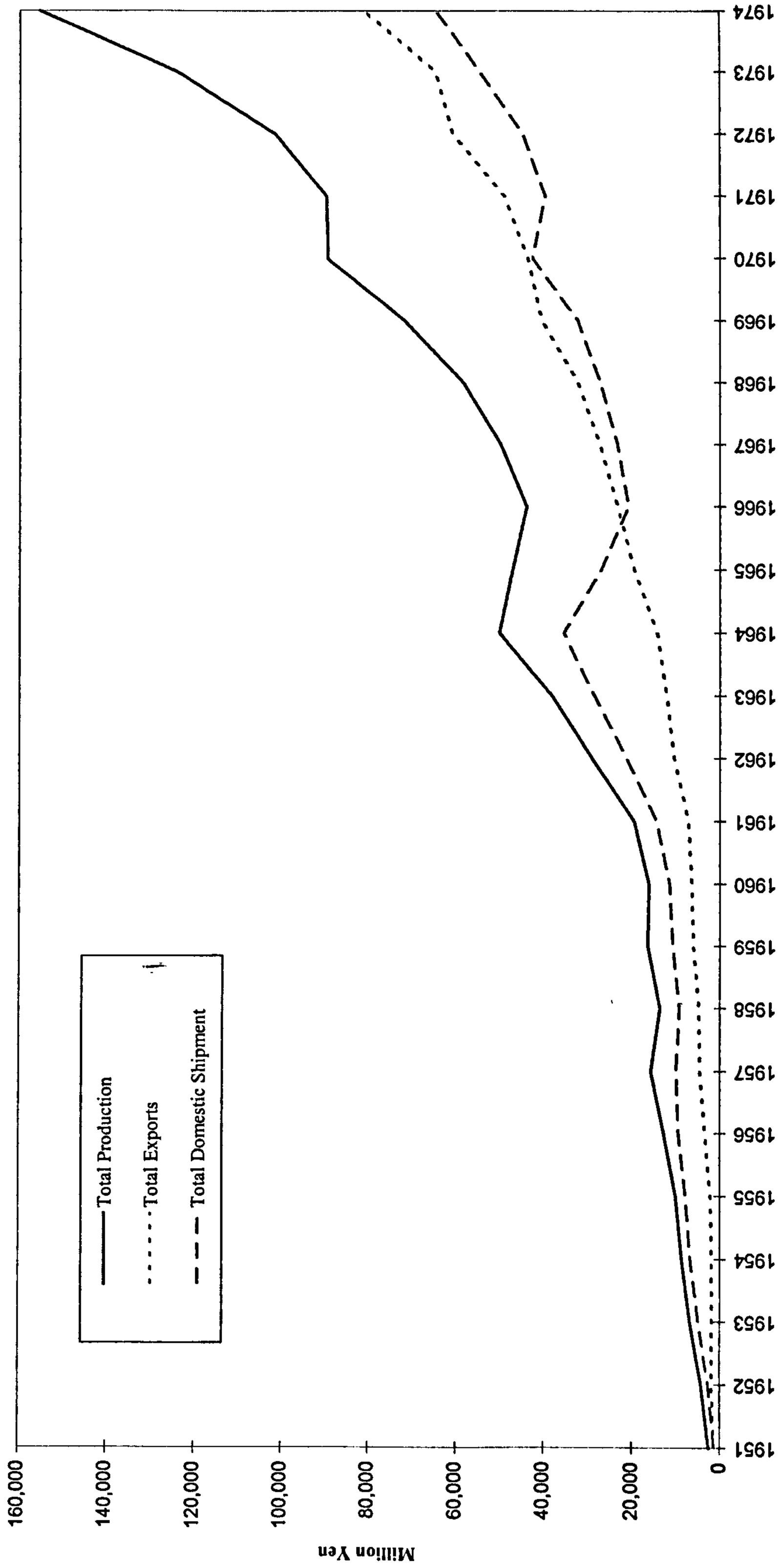
The Canonet was technologically superior to any other Japanese camera at that time, and *Amateur Photographer* (October 26, 1960, p. 631) called it "one of the most ambitious" cameras introduced at the 1960 Photokina Show (i.e. it was not introduced at the Japan Camera Show). According to Miyabayashi (1963, p. 44), Canon agreed to cooperate with the other JCIA member companies by withholding the camera from the Japanese market for six months while the other firms caught up. On January 24, 1961, the day the camera was introduced at Mitsukoshi Department Store in Tokyo, all 300 units sold within 30 minutes (JCII, 1984, p. 123).

Domestic competition among the photography firms intensified again after 1960. In preparation for the Tokyo Olympics, every manufacturer increased capacity to its maximum limit encouraged by the government's high speed growth policy (Tsuruta, 1988). The volume and value of still camera production and sales reached a peak that year (see graphs 4.1 and 4.2). Firms aimed to satisfy domestic demand as well as tax-free sales to tourists during the Olympics, held near Yoyogi Park in Tokyo (JCII, 1984). To promote Japanese camera and film sales and provide film processing and camera repair services, the JCIA set up a camera center in the Yoyogi Olympic Village (*Camerart,* March 1989). To ensure that only top-quality (and high-priced) cameras and lenses were sold to the tourists who visited Japan for the Olympics, all tax-free photographic goods (i.e. cameras and lenses) had to pass JCII inspection as if they were regular exports. Due to the very high volumes sold, the JCII, which charged a one percent fee for every exported or tax-free item, was able to increase its financial base significantly from that year forward.

After the Olympics, the Japanese economy entered a mild recession, and a price war among the camera manufacturers ensued. The top firms realized that they might soon lose market share to smaller firms, such as Asahi Optical manufacturer of the Pentax Spotmatic which was one of the most popular SLR cameras of the day (Lothrop and Schneider, 1994, p. 64). Asahi Optical did not enter camera manufacturing until 1952, but it is one of the oldest manufacturers of high quality optics and prior to making cameras was a long-time supplier to leading firms including Konica and Minolta (Condax, *et al,* 1984. p. 12).

The solution to the problem of over-capacity in the photography industry was to form a recession cartel with the JCIA member companies. Since most industries had expanded rapidly in the early 1960s due to the government's high-speed growth policy, these cartels were not particularly unusual (Tashima, 1965). Yutaka Kosai (1988, p. 47, note 33) found that in

Graph 4.2 Japan's Total Production, Exports and Domestic Shipment of Still Cameras (Value), 1951-1974



Figures are from JCIA statistics and include those produced by overseas subsidiaries of JCIA member companies.
Source: JCIA (1987) *Nihon Kamera Kogyo-shi* (The History of the Japanese Camera Industry), Tokyo, JCIA, p. 375.

machinery industries, including the photography industry, 14 recession cartels were approved by MITI in 1963 and another 14 in 1964. This compares to only six cartels in 1962 and nine in 1965. Under the leadership of Canon's Mitarai, the heads of the top firms of the JCIA met over lunch to discuss the cartel issue (JCII, 1984, pp. 165-167). Although the industry was rather large, in 1961, the top five firms (of a total of 37 JCIA member companies) controlled 52.5 percent of total production (Miyabayashi, 1963, pp. 43-44). The leading firms decided to apply for permission from MITI to set up a temporary recession cartel for six months at first beginning in April 1965. MITI decided that since the firms had engaged in tough price competition, or 'excess competition,' a recession cartel was warranted for 35 mm camera production. The Japan Fair Trade Commission (JFTC) approved a six-month extension of the cartel until March 1966 when it folded (*Camerart*, March 1989; Tashima, 1965).

The 12 members of the cartel (i.e. Asahi Optical, Canon, Fuji Photo Film, Konica, Mamiya, Minolta, Nikon, Olympus, Petri Camera, Ricoh, Tokyo Optical, and Yashica) controlled 80 percent of total Japanese camera production in 1965. They agreed to control retail prices and limit their production of 35 mm cameras to a total of 1,462,665 units which meant a reduction in total production by 20 percent (JCII, 1984, p. 167; Miyabayashi, 1963, p. 127). The production break down was as follows: focal plane shutter cameras (including SLRs): 273,607 units; lens shutter cameras: 549,048 units; and half-frame cameras: 640,010 units. Firms were protected from excessive price gouging and the meager demand that did exist in Japan was satisfied by warehouse stock rather than by popular, new products. Market leaders retained their places at the top while smaller firms suffered. Although the cartel hindered, for example, Asahi Optical's chances of gaining a larger share of the market and perhaps becoming one of Japan's largest volume camera/lens producers, the firm was still very successful and had already joined the top five firms (*Focal Encyclopedia*, 1978, p. 803).[9]

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[9] This information is also based on interviews with industry specialists, Spring 1996.

Other solutions to overcapacity were to expand export markets, particularly exports to the 'new' markets in Europe, to diversify production, cut production of unprofitable goods, reduce firm spending and cut the share of domestic market in total production. Many firms pursued all of these strategies. The general decline in dependence on domestic sales can be seen in graphs 4.1 and 4.2, and this trend has continued up to the present day (see chapter five). Exporting firms depended heavily on the US market, but with the help of the JCIA and the JCII they turned their attention toward European markets.

Beating the West Germans in European Markets

Japan's postwar export promotion of cameras and lenses began with indirect exports through the PXs and continued with direct exports to the US market. According to Kinji Moriyama, by 1960, the Japanese photography firms had essentially destroyed their competition (Yayama and Ito, 1988, p. 334). This was true in the US market in the 1950s, and the photography firms turned to Europe to do the same through export promotion during the 1960s. A report prepared for the US Department of Commerce Business and Defense Services Administration in 1962 (p. 1) commented that "[t]he [Japanese] camera industry, which has devoted the major proportion of its export sales promotional activities to the United States, now plans a considerable expansion elsewhere, particularly in Europe." In 1964, Japan's camera and lens exports were nearly evenly divided among the US, Europe and the rest of the world (Tashima, 1965, p. 25), but by 1973, roughly 80 percent were exported to the US and Europe (JCII, 1984, p. 301) and the volume of total exports had grown substantially.

Japanese camera/lens exporters faced three major problems in European markets throughout the 1960s: trade barriers, lack of brand recognition and the logistical challenge of distribution. The first was primarily

addressed via government channels and the other two mainly by the firms with the help of the various industry associations. The JCII and the JCIA developed and expanded their international standards setting activities and public relations campaigns, and in so doing helped the photography firms develop a positive image for their products in Europe (JCIA, 1987; JCII, 1984). Firms focused on building market share by establishing strong distribution networks, and over time raised consumer awareness of Japanese brands which in the early 1960s were seldom seen in European markets (*Amateur Photographer*, November 2, 1960, p. 658). Just as in the US in the 1950s, government-industry *cooperation* was essential in making export promotion work in Europe.

Throughout most of the decade, opposition to imports of Japanese cameras and lenses was slow to relax in European markets, especially in the West German market (cf. JCIA, 1987; JCII, 1991). In the late 1950s, for example, Japanese goods sold for the same prices as other photographic goods in West Germany despite the disparities in quality and actual production cost. According to Seki, *et al* (1961, p. 89), a Leica I cost three times as much as a Canon Popular in Japan priced at about ¥150,000 or $417. But, a middle-range Canonet, priced at approximately ¥20,000 or $56 in Japan, cost almost as much as a top-of-the-line Leica IIIG in West Germany. Japanese goods were eventually successful as prices dropped and markets gradually opened. European markets were not as open to Japanese cameras and lenses as the US had been.

Working in the Japanese industry's favor was the West German government's policy of full employment. Because the number of people employed in the photography business increased throughout the 1960s and 1970s, the West German government showed little concern for the fact that only a very few manufacturers were able to survive the competition from the Japanese firms (JCII, 1991, pp. 7-10). Most new West German jobs came in distribution (of Japanese cameras/lenses) and in photofinishing as

photography became more affordable to a larger proportion of the population. As long as people were employed, West German government officials showed little concern about the manufacturing side of the industry.

Competition in cameras/lenses was not as keen between the US and Japan as they were between West Germany and Japan. West German-Japan bilateral trade was tense because Japanese companies concentrated their efforts on the 35 mm format, particularly on SLR cameras and interchangeable lenses which competed directly with West German goods. American and Japanese firms mainly competed in different goods and the US market was opened wide to Japanese camera/lens exporters (see above). Furthermore, in the early 1960s, Japan was the second largest market for US photographic products (DoC, 1964, p. 9, table 4). Kodak, the largest American photographic firm, dominated global film sales by periodically coming out with new film formats mainly to boost sales (see chapter three). The US government only became concerned with the Japanese photography industry on the issue of photographic film in the 1990s because American exports of photographic goods to Japan did not flourish from the 1970s onwards (see chapter five). This is why film, but not cameras/lenses, became a target of US-Japan trade talks.

The Japanese photography industry was no exception to the common pattern pursued by Japanese exporters of flooding of international markets with goods (cf. Dore, 1986; Fruin, 1992). Targeting specific markets with a few particular export items has been called 'laser beam exporting' (cf. Lincoln, 1990). In the 1960s, the flood of Japanese camera/lens imports was likened in the European press to the invasion of Ghenghis Khan (Lewis, 1991, p. 136). As noted above, Japanese cameras and lenses competed with West German production in the US market and then in European markets. In the early 1960s, Japanese photography firms expanded production capacity which caused problems at home (see above) and would have caused further headaches if export volumes to European markets had not risen. This allowed many

exporters to achieve economies of scale without making serious cut backs in production (see graphs 4.1 and 4.2).

Reductions in import quotas and tariffs in the European markets came thanks to growing pressure from the US for 'free trade' among industrialized nations. This played a significant role in the success of Japan's export promotion to Europe (JCIA, 1987). International trading arrangements including the General Agreement on Tariffs and Trade (GATT) brought pressure to bear on European nations as well as on Japan to open their markets to international trade, but Japan found it easier to delay opening its market because of US foreign policy. American military security objectives took priority over economic and trade issues from the end of WWII until roughly the 1980s. Since Japan was one of America's key allies in the Pacific, Japan's compliance with the GATT, among others, was allowed to move forward comparatively slowly (cf. Tsuru, 1996).

In Europe, Japanese camera and lens makers sold high-quality goods at comparatively low prices due to a favorable exchange rate and to mass production techniques. This led to accusations of dumping in European markets (JCII, 1984; Tashima, 1965). At the initiative of the Japanese government, a series of trilateral (US-West Germany-Japan) talks began in the late 1960s about the direction the global photography industry should take. Eventually, the talks led to reassurances from Japanese firms that they would not enter into cut-throat competition with the German firms and in exchange, the German market was gradually opened to imports of Japanese cameras/lenses (JCIA, 1987). But, it was already too late for many of the West German firms; the price and consumption trends that had been set early in the decade continued unabated. According to the JCII, the talks did help break down some of the misperceptions that had grown on both the Japanese and the West German sides, and it helped build trust among the governments and the firms.

In developing closer relations, specific Japanese personalities began to emerge as leaders in what soon became the global photography industry. Kinji Moriyama, president of the JCII and member of the Japanese Diet, participated actively in the trilateral talks and subsequently became known in the US and Europe as 'Mr. Japanese Camera' (Yayama and Ito, 1988, pp. 335-336). In Japan, he was called 'camera Moriyama' (*kamera no Moriyama*) for his enthusiasm about the photography industry. Because of his active engagement in the industry, Moriyama received numerous commendations and awards including the prestigious Photokina pin in 1972 (JCII, 1984, pp. 506-507, 510).[10] Four years later, he was named to the Photo Marketing Association's (PMA) Hall of Fame. Several Japanese industrialists also developed international reputations for their efforts to advance the photography industry. Dr. Takeshi Mitarai, the founder and president of Canon was awarded the Photokina pin in 1970. He was the first Japanese industrialist to be recognized by Photokina, a predominantly German institution, and this stood in sharp contrast to Mitarai's experience at the fourth Photokina Show in 1954. Then, Canon (with Mitarai at the helm) which was the first Japanese firm to participate in the trade show was forced to exhibit its cameras and lenses in a remote corner of the exhibition hall.[11] Kazuo Tashima, president of Minolta, was the second Japanese industrialist to receive the Photokina pin in 1974. Both Mitarai and Tashima were named to the PMA Hall of Fame in 1981 and 1983 respectively.

Japanese cameras and lenses began to make an impact in the West German market in 1959 reaching 11 percent of total imports (from negligible levels earlier in the decade) and attaining more than a 22 percent share by 1967 (see table 4.4).[12] The Swiss share of the West German market dropped over the 1956 to 1968 period from 26.5 to 4.1 percent, most likely because of the overall expansion of the market, especially in sales of low-cost cameras/lenses rather

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[10] Photokina is the bi-annual international photography exhibition held in Cologne since 1950.
[11] Information based on interviews with JCII officials, Spring 1996.
[12] The West German import and export figures for 1968 indicate total imports of photographic equipment and supplies.

Table 4.4 West German Imports of Photographic Products by Country of Origin, 1956-1968[a,b] (value: thousand DM, percent of total)

Country of Origin	*1956*		*1957*		*1958*		*1959*		*1967*		*1968[c]*	
	Value	*Percent*	*Value*	*Percent*	*Value*	*Percent*	*Value*	*Percent*	*Value*	*Percent*	*Value*	*Percent*
United Kingdom	951	8.2	841	5.2	740	3.8	1,467	5.4	44,000	23.1	52,784	23.2
Japan[d]	...	...	...	...	...	...	2,977	11.0	42,696	22.5	50,988	22.4
United States	1,754	15.2	3,833	23.8	3,960	20.3	4,084	15.0	39,424	20.7	43,352	19.1
Netherlands	749	6.5	875	5.4	821	4.2	1,699	6.3	14,732	7.7	23,684	10.4
France	1,105	9.6	1,311	8.1	1,081	5.5	1,718	6.3	10,692	5.6	12,852	5.7
Italy	...	...	...	...	...	...	...	...	8,604	4.5	11,132	4.9
Switzerland	3,060	26.5	5,335	33.1	4,563	23.4	6,785	25.0	9,276	4.9	9,388	4.1
Benelux	...	...	...	...	...	...	...	...	2,412	1.3	2,380	1.0
Sweden	...	...	...	...	...	...	...	...	2,544	1.3	1,888	0.8
Austria	1,675	14.5	1,360	8.4	1,535	7.9	1,357	5.0	...	...	...	...
Others	2,263	19.6	2,564	15.9	6,801	34.8	7,092	26.1	15,728	8.3	18,872	8.3
Total	11,557	100.0	16,119	100.0	19,531	99.8	27,179	100.0	190,108	100.0	227,320	100.0

Notes: [a] Photographic products includes cameras, lenses and film. Value of contract processing is not included. Imports were negligible prior to 1956.

[b] Figures for 1967 and 1968 are for imports of photographic equipment and supplies.

[c] Estimated from official data, January-November 1968.

[d] Prior to 1959, imports from Japan (which accounted for a very small percent of the total) were listed under 'Others'.

Sources: Department of Commerce (1960) "The Development of the West German Photographic Products Industry, 1954-59," Washington, DC, Scientific, Motion Picture and Photographic Products Division, Business and Defense Services Administration, p. 18; and Department of Commerce (1968) "The German Photographic Products Industry and Market 1968," Washington, DC, Business and Defense Services Administration, p. 12.

than the higher-cost Swiss products. The rise of the UK's market share in West Germany, from 8.2 to 23.2 percent over the same period, may have been due to a greater demand for lower-cost goods produced there (mainly by Kodak) or perhaps due to demand for Japanese goods distributed from the UK into the West German market.

In 1968, the largest share of West German imports from Japan was taken by motion picture cameras (DM 15.3 million or $3.8 million), with still cameras and photographic lenses performing well at roughly DM 12 million ($3 million) each (DoC, 1968, p. 12). The seven fold increase in the total value of West German imports between 1959 and 1967 and the 20 fold increase over the entire 1956 to 1968 period indicates how open the West German market had become, not only for Japanese goods.

In contrast, West German still camera exports to Japan faced an increasingly tough climate from the mid-1950s. The market liberalization in Europe was not reciprocated by Japan until the late 1960s and early 1970s. Between 1954 and 1959, West German camera exports to Japan fell from DM 11.9 million ($3 million) to DM 544 thousand ($136 thousand) (see table 4.5). By 1968, the industry recovered slightly to DM 1.7 million ($425 thousand). If exports to Japan of photographic lenses are included in the 1968 figures, the total was DM 3.2 million ($800 thousand) or almost twice that of still cameras alone (DoC, 1968, p. 7). Thus, the demand for high-quality West German photographic lenses remained stronger than demand for West German still cameras. Worldwide, West German still camera exports increased by 20 percent over the 1954 to 1959 period, but a decreasing share went to Japan. But by 1968, the situation in West German photography industry had worsened such that total exports fell back to the levels of the previous decade.

Total unit production of Japanese still cameras surpassed West German production in 1962 at 3.1 million vs. 2.6 million units. By 1974, Japan's production reached nearly twice (1.75 fold) the West German levels at 6.6

Table 4.5 West German Exports of Still Cameras by Country of Destination, 1954-1968[a,b] (value: thousand DM, percent of total)

Country of Destination	*1954*		*1955*		*1958*		*1959*		*1967*		*1968[c]*	
	Value	*Percent*	*Value*	*Percent*	*Value*	*Percent*	*Value*	*Percent*	*Value*	*Percent*	*Value*	*Percent*
United States	36,347	26.0	37,643	23.2	38,416	25.8	42,743	25.2	23,524	16.7	34,840	23.9
Japan	11,872	8.5	9,992	6.2	550	0.4	544	0.3	1,304	0.9	1,692	1.2
United Kingdom	8,175	5.9	10,118	6.2	12,722	8.5	21,361	12.6	5,556	3.9	3,868	2.7
Sweden	7,833	5.6	8,713	5.4	6,838	4.6	7,281	4.3	3,392	2.4	3,252	2.2
Switzerland	5,245	3.8	7,613	4.7	7,017	4.7	9,429	5.6	8,860	6.3	7,920	5.4
Denmark	5,223	3.7	4,341	2.7	3,315	2.2	3,928	2.3	2,372	1.7	1,920	1.3
Canada	5,206	3.7	6,561	4.0	5,014	3.4	4,119	2.4	3,740	2.7	2,740	1.9
Italy	5,076	3.6	6,946	4.3	7,754	5.2	8,482	5.0	11,780	8.3	11,180	7.7
Australia	4,653	3.3	5,743	3.5	4,386	2.9	7,229	4.3	1,416	1.0	1,760	1.2
Hong Kong	4,096	2.9	4,725	2.9	3,270	2.2	5,260	3.1	3,300	2.3	4,532	3.1
Austria	3,719	2.7	5,361	3.3	8,549	5.7	8,263	4.9	5,088	3.6	4,260	2.9
Netherlands	3,366	2.4	4,538	2.8	4,332	2.9	4,881	2.9	8,156	5.8	8,880	6.1
France	2,816	2.0	4,199	2.6	3,022	2.0	3,341	2.0	26,548	18.8	27,600	19.0
Benelux	2,447	1.8	3,015	1.9	2,984	2.0	3,301	1.9	4,620	3.3	4,920	3.4
Others	33,607	24.1	42,522	26.2	40,760	27.4	39,626	23.3	31,440	22.3	26,184	18.0
Total	139,681	100.0	162,030	100.0	148,929	100.0	169,788	100.0	141,096	100.0	145,548	100.0

Notes: [a] Includes still cameras for technical and scientific purposes, 1954-1959.

[b] Figures for 1967 and 1968 are for photographic equipment and supplies.

[c] Estimated from official data, January-November 1968.

Sources: Department of Commerce (1960) "The Development of the West German Photographic Products Industry, 1954-59," Washington, DC, Scientific, Motion Picture and Photographic Products Division, Business and Defense Services Administration, p. 17; and Department of Commerce (1968) "The German Photographic Products Industry and Market 1968," Washington, DC, Business and Defense Services Administration, p. 7.

million vs. 3.9 million units.[13] Japan's total exports of still cameras exceeded West Germany's in 1967 at 2.3 million units, and by 1974, the Japanese still camera exports more than doubled to 4.8 million units while the West German total was 3.1 million units. US exports of still cameras fluctuated over the 1964 to 1994 period close to the levels of West German exports. Value figures for Japan, West Germany and the US from 1964 to 1994 shown in graphs 4.3 and 4.4 indicate the same trends as unit production.

Part of the challenge that the Japanese photography firms faced overseas was that they were viewed as a collective, that is as the *Japanese* industry. Evidence of this is the American Society of Magazine Photographers Memorial Award presented on May 3, 1961 to "The Japanese Camera Industry for their constant cooperation with professional photographers to improve the instruments with which we work, and the high professional standards attained by them, which have benefited the whole field of photography." (JCII, 1984, p. 150.) According to the JCII, this recognition of the contribution of Japanese firms to the advancement of the photography industry was helpful in lowering some of the protectionist barriers against Japanese cameras and lenses in Europe, but as discussed above much was left to be done.

Japanese firms would not have been able to supply affordable goods that European consumers wanted if they had not invested in new manufacturing equipment, improved their mass production techniques, and applied new materials and technologies. The West German photography industry faced two problems by the late 1960s: labor shortages and wage increases (DoC, 1968). The former meant that capacity increases were difficult to bring about without increased mechanization, and the latter meant an increase in the price of goods. In contrast, Japanese firms invested heavily in plant and equipment based on a five-year plan starting in 1955. According to Miyabayashi (1963, pp. 44-47), a JCIA survey of 40 member companies in 1956

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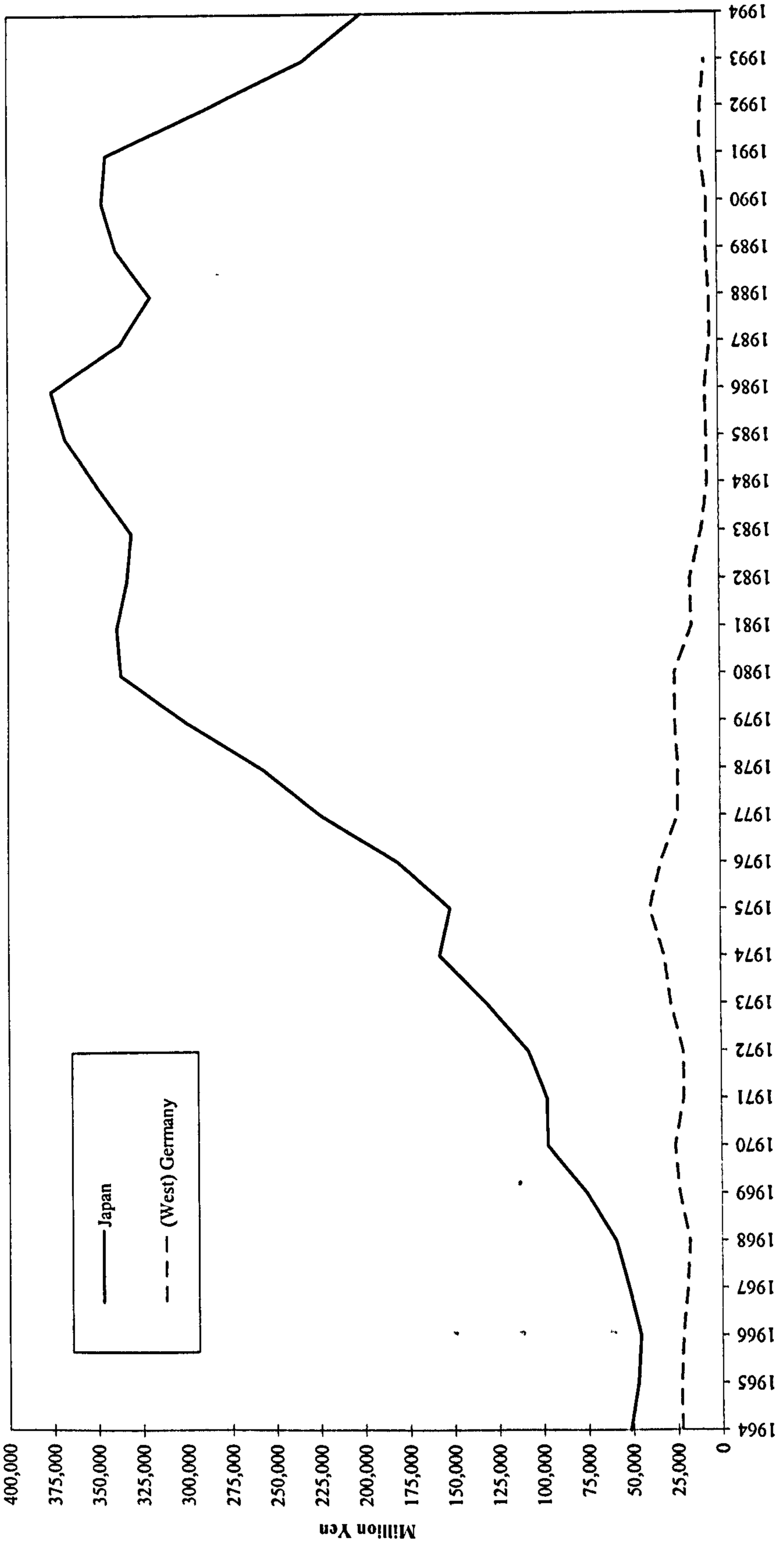
[13] For the 1962, 1967 and 1991 figures see JCII, 1991, p. 4; and for the 1974 figures see "Germany and Japan 1975," 1976, p. 25.

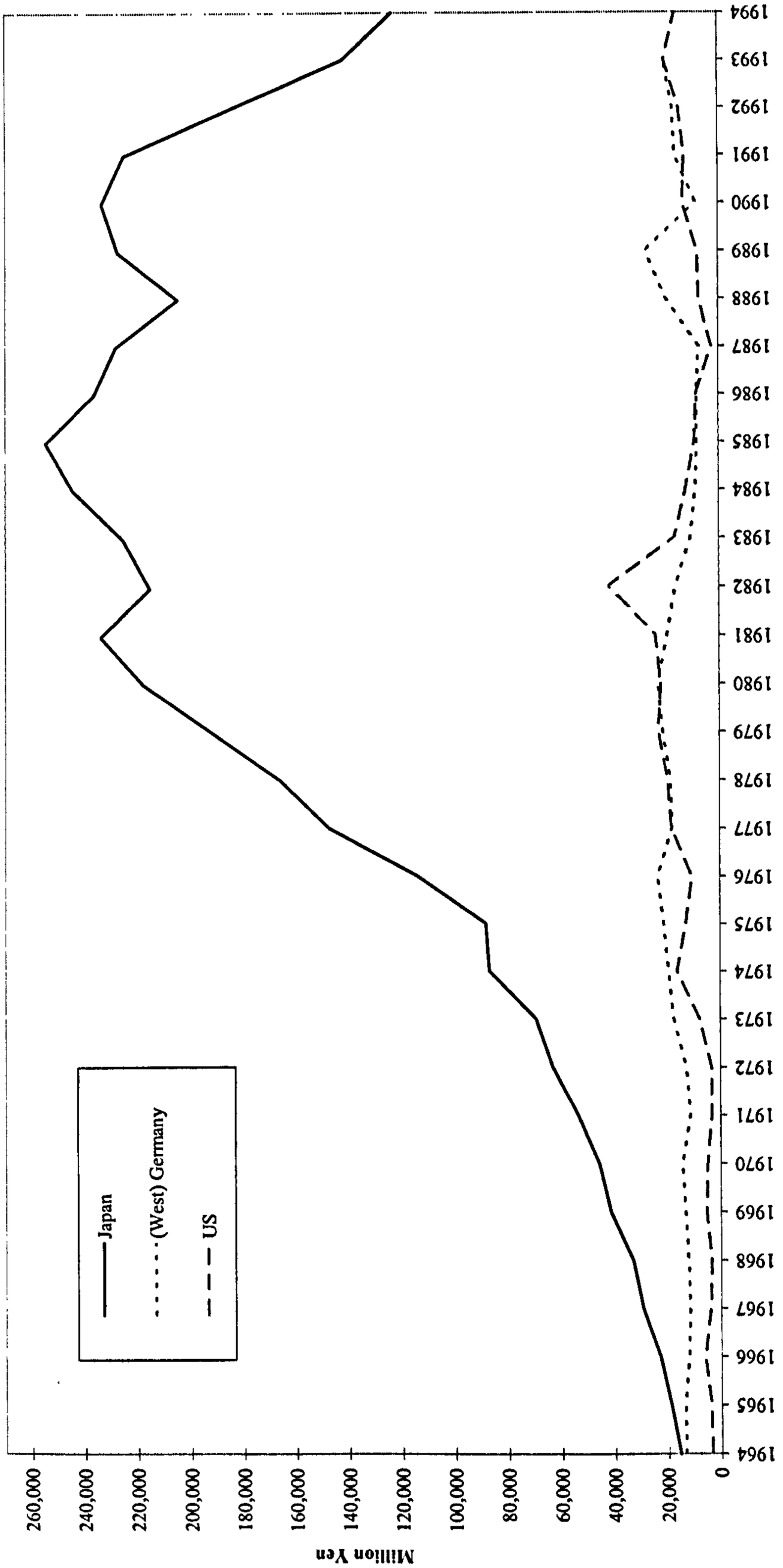
Graph 4.3 Japan's and (West) Germany's Production of Still Cameras (Value), 1964-1994



Notes: Japan's figures for 1973 and 1974 are estimates. Special cameras are excluded in the (W.) German figures.

Sources: JCIA (1990) *JCIA Report '90*, Tokyo, JCIA, p. 68; JCIA (1995) *JCIA Report '95*, Tokyo, JCIA, p. 61.

Graph 4.4 Comparison of Japan, (West) Germany and US Still Camera Exports (Value), 1964-1990



Notes: Japan's figures for 1973 and 1974 are estimates, and single-use cameras are included in the Japanese and American figures from 1989.

Sources: JCIA (1990) *JCIA Report '90*, Tokyo, JCIA, p. 68; JCIA (1995) *JCIA Report '95*, Tokyo, JCIA, p. 61.

revealed plans to purchase a total of 4,347 domestic or foreign-made machine tools (e.g. automatic lathes, drilling machines, milling machines and gear cutters) over the 1956 to 1960 period. By March 1961, the plan had been carried out. It was part of a manufacturing industry-wide plan to replace obsolete or obsolescent machine tools which at 10,105 machines accounted for roughly two-thirds of all precision equipment according to a 1958 MITI survey. The concrete results of the new investment for the photography industry was that it allowed firms to shift from manual to automatic lens machining, to employ specialized machines for camera body making, and to raise precision levels of finished products through improved inspection methods.[14]

Modern production facilities in Japanese photography factories allowed firms to cut their production costs (Tashima, 1963). Using 1952 as the base year (1952=100) of an index of average production costs in Japan, costs fell to 95.3 in 1955 and continued downward to 68.5 in 1960 (Miyabayashi, 1963, p. 81). Retail prices of cameras plummeted to 65 in 1960 (1955=100) and relative to other consumer durables, only televisions experienced a more dramatic retail price drop (see appendix 4b). At the same time, West German wages rose by 20 percent and prices increased by roughly 10 percent (Miyabayashi, 1963, pp. 127; 129). West German prices were affected by the relatively large share of labor costs which reached roughly 35 percent of total production costs by the end of the 1960s (DoC, 1968, p. 3).

Although cooperation with the government, the JCII and the JCIA for camera/lens export promotion was important, it was not the only reason for the success of the Japanese photography firms in Europe. Firms also needed to establish their own reputations by differentiating their products. To do this, they developed effective marketing and distribution channels, pursuing a formula of one sales agent per country (*ichi kuni ichi eejento hoshiki*) (Takahashi, 1963, p. 14; Tashima, 1965, p. 26). This is particularly notable in Europe where

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[14] See Cohen (1949, pp. 201-208) on the state of Japan's machine tool industry during WWII and on the usability of the existing machine tools by 1949.

each leading Japanese exporter has one sales agent in nearly each country (see appendix 4c).

Unlike many Japanese industries, the camera/lens firms did not rely heavily on general trading companies (*sogo shoshia*) for building overseas markets. Most trading companies had no experience with selling cameras or the other optical goods produced by the photography firms (e.g. microscopes, telescopes and optical measuring instruments), and therefore had no idea how to go about developing export markets for them.[15] Today, only a four photography firms are core members of horizontal *keiretsu* groups (i.e. Asahi Optical in Dai-Ichi Kangyo, Canon in Fuyo, Kyocera in Sanwa, and Nikon in Mitsubishi) (Gerlach, 1992). Three are members of more than one horizontal *keiretsu* group (i.e. Konica with Mitsubishi and Sanwa, Minolta with Mitsui, Sanwa and Sumitomo, and Olympus with Fuyo, Sanwa and Sumitomo) and one apparently has diffuse ties to one *keiretsu* group (e.g. Fuji Photo Film with Mitsui) (cf. Wilkie, Farr and Gallagher, 1995).

The *keiretsu* group can be important since firms often rely on skill and experience of the trading company in the *keiretsu* to help with overseas markets. However, in the early 1950s, when the photography firms began to export directly to the US market, *keiretsu* groups did not exist or were in the early stages of reorganization. The GHQ deconcentration program run by American 'New Dealers,' who were against the power of big business, broke up Japan's prewar *zaibatsu* concerns because they believed that these family-run holding companies had controlled most of the Japanese wartime economy and had willingly cooperated with the military (Nakamura, 1981; Tsuru, 1996). It was not until after the Occupation ended in 1952 that the horizontal *keiretsu* were organized as the successors to the *zaibatsu* but without the family ties or the holding companies. *Keiretsu* groups usually have one main bank, one trading company and one insurance company at their core (cf. Gerlach, 1992). Since the camera/lens manufacturers did not rely on trading companies, it

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[15] Information based on interviews with industrialists, Spring 1996.

was essential that each firm learn about local market conditions by establishing an agent to handle their trade in each country (Takahashi, 1963).

In the US, many of the photography firms set up manufacturing and/or distribution arrangements with Japanese firms in the late 1950s and early 1960s. Argus tied up with Mamiya, Ansco with Minolta, Kodak with Chinon, and Sears Roebuck with Asahi Optical at first and later with Mamiya (Miyabayashi, 1963, p. 116). The Japanese cameras were supplied on an original equipment manufacturer basis, because it was cheaper for the US firms than trying to keep up with their Japanese competitors. A similar situation emerged in West Germany where many photography firms admitted that competition from their Japanese rivals was cutting into their market shares and their profits in the early 1960s. As a consequence, some Japanese and West German firms developed technical tie-ups and production agreements.

In 1974, Zeiss and Yashica set up an arrangement in which Yashica manufactured the camera body for the Contax RTS and Zeiss made the lenses (Lewis, 1991, pp. 134; 146). When Zeiss closed its Brauschweig (West Germany) factory in 1972, the firm exited from the consumer camera business. The firm claimed that the strong Deutsch mark was why they decided to close the plant, but the real reason, according to Lewis (1991), was the success of the Japanese cameras and lenses. Yashica was absorbed into Kyocera in 1983, and today, Kyocera/Yashica continue to manufacture Contax cameras outfitted with Zeiss lenses.

In 1972, Ernst Leitz approached Minolta to discuss a cooperative production arrangement involving licensing and patents, not capital or stock, for their Leica cameras.[16] According to Miyabayashi, Minolta was thrilled at the proposal, but it took over six months for Minolta to modernize the proposed Leitz-Minolta CL camera to make it profitable to manufacture. Leitz

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[16] Personal communication from Akio Miyabayashi, Senior Corporate Advisor, Minolta Corp., 29 June 1998.

had drawn up the camera specifications for hand-made production, but Minolta used an automatic conveyor-belt system. Technologically, there was no difference between the Leica and the Minolta lenses outfitted for the camera, but the price of the Minolta was less than half of the Leica lens. The Leitz family sold the company to a Swiss firm and changed production strategy to manufacture only their Leica M line of cameras in Canada and Portugal. Many other camera models were supplied by Minolta (among others) on an original equipment manufacturer (OEM) basis. Leitz sold the Minolta OEM cameras after minor modifications and with their own lenses for two to three times the price of Minolta's own models.

By the end of the 1960s, Japanese firms dominated the 35 mm camera market which had traditionally been the West German preserve (see chapter three), and they concentrated on the SLR format.[17] In the early 1960s, lens shutter (LS) cameras rose in the popularity over focal plane (FP) shutter cameras, although SLR cameras (of the focal plane shutter type) saw considerable growth (see appendix 4d). In 1960, the value of LS camera production in Japan reached $18.8 million and grew by 40 percent (to $26 million) the following year. Production of FP shutter cameras slipped by roughly 50 percent over the same period. However, SLR camera production expanded by over 35 percent between 1960 and 1961 (from $7.6 million to $10.3 million) and became the camera of choice among hobbyists by 1970 (DoC, 1962, p. 4). Japan's strength in SLRs and their rise in popularity due to reductions in production cost helped the Japanese exporters gain control of European markets.

The editors of *Camerart* (April 1990, p. 25) characterize the 1960 to 1975 period as one of 'development' because technological advances meant that cameras became more high tech. Electronics minimized the number of accessories, decreased weight, improved focusing performance and shutter

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[17] Kodak's West German subsidiary, specialized in 35mm camera production, was also affected by the Japanese competition (*Focal Encyclopedia*, 1978).

speeds *and* cut production costs (Tashima, 1963). New materials made it possible to achieve faster, more accurate timing between the light meter, flash and shutter, to improve the clarity of optical glass and to reduce the weight. Computers were used in optical design to minimize production time and to achieve consistent quality (Boon, 1970). An important effect of camera automation was that it improved the performance of photographic film through, e.g. metering systems that measured how much light hit the film surface. With better film performance, more photographs were taken and more film was processed (see chapter five).

Conclusion

Exports of Japanese cameras and lenses went to the US market first through the military PXs and later through 'regular' channels. Because of conditions described in chapter three, the US market was wide open to Japanese cameras and lenses, and Japanese exports expanded at a rapid rate throughout the 1950s. Japanese camera/lens firms repeated this performance by expanding exports to European markets during the following decade. Cooperation among the Japanese camera/lens exporters was vital in developing the US and then the European markets, and they did this with the help of the JCIA, the JCII, Kinji Moriyama and MITI.

In the US, the New York camera center actively aided all Japanese exporters with market research, service and distribution. Similar camera centers were planned for Europe in the early 1960s to help develop export markets there. Instead, in 1963, MITI created four Light Machinery Centers in New York, London, Dusseldorf and Bangkok for all Japanese exporters of e.g. cameras/lenses, electronics and sewing machines. The marketing activities of the camera/lens exporters were absorbed into the new MITI controlled centers. As Japan pursued trade and capital liberalization in accordance with international norms, MITI lost its tight rein on Japan's industrial development.

This was an undesirable situation for MITI, so it developed new means of control over Japanese firms through, for example, the Light Machinery Centers. But by that time, the growing international success of the Japanese camera/lens exporters meant that they were beginning to become less dependent on cooperation with each other and with MITI.

In Japan, the domestic market for high-quality cameras and lenses (which were being promoted as exports) remained small until the excise taxes were lowered in April 1962 thanks to the efforts of *zoku* politician Moriyama. Thereafter, domestic demand grew for higher-priced cameras and lenses and the variety of cameras for sale expanded. Many firms were forced out of business and domestic competition turned to cut-throat pricing. To bring the situation under control and to prevent more firms from gong bankrupt, the JCIA member companies agreed to price controls and to bi-annual product introductions. Problems of price competition appeared again after the 1964 Tokyo Olympics due to overcapacity. This time, the leading JCIA member companies (mostly the exporting firms) formed a recession cartel to maintain retail prices and cut production by 20 percent. The cartel which was approved by MITI and the JFTC lasted one year.

Most of the camera/lens exporters sought to increase their exports to Europe so as to avoid capacity reduction altogether. This came at the same time that trade and investment barriers were falling throughout Europe, making for greater market access than had been possible a decade earlier. (Barriers fell less quickly in Japan, especially for color photographic film which remained protected until 1971. See chapter five.) Rising disposable incomes, the growth of leisure time and a favorable foreign exchange rate for the yen (unchanged since 1949) also contributed to the Japanese camera/lens exporters' success in European markets. Cameras and lenses produced by Japanese exporters appealed to European customers who wanted high quality but affordable cameras. Exports to Europe rose quickly and by the end of the 1960s, Japanese firms controlled the global market for cameras and lenses.

Perceptions of the quality of Japanese cameras and lenses changed as the market for automated, mass-market products grew. The JCII and the JMDC made a strong effort to raise product standards and assure consumers that all exported cameras and lenses had been tested and that all camera designs were original. Higher-tech, high-quality products such as compact 35 mm SLRs with instant return mirrors and interchangeable lenses created new demand for Japanese cameras/lenses as firms differentiated their product lines (see appendix 4d). Consumers in the US and Europe purchased mass-market Japanese cameras/lenses that offered a similar range of options and quality as professional cameras/lenses at much lower cost.

West German firms were slow to realize that Japanese high-quality, reliable and yet inexpensive cameras and lenses had created a mass market for photography in the 1960s. Falling camera/lens prices due to process innovations in Japanese camera/lens manufacturing combined with rising disposable incomes in the US and Europe meant that photographs and picture-taking became a part of everyday life. The rise of photojournalism and magazines such as *Life* (US), *Paris Match* and *Picture Post* (UK) meant that photography touched more people's lives than ever before. The increased interest, awareness and accessibility of photography played an important part in the success of the Japanese camera/lens manufacturers and their products.

During the 1950 to 1973 period, Japanese camera/lens exporters out-performed American and West German firms in manufacturing, marketing and distribution. Japanese cameras and lenses began to set industry standards and test the limits of innovation and creativity. But, it took time before the image of shoddy Japanese workmanship was overcome in the US and Europe. Moriyama emerged as a key figure in the 1960's tri-lateral Japan-US-West Germany talks about the direction of the global photography industry. His efforts to break down misperceptions of Japanese cameras/lenses and to assure the Americans and West Germans that Japanese firms would not drive all competitors from the market earned him the name 'Mr. Japanese Camera.'

Nonetheless, the battle for global dominance in cameras and lenses during the 1960s ended with the Japanese firms ahead, where they have stayed ever since. (See appendix 4e for sales and profit figures for eleven Japanese camera/lens manufacturers from 1966 to 1975.)

Japan's industrial policy of export promotion worked very well in the early years when *cooperation* among the camera/lens exporting firms was perceived as important for the success of the whole industry (i.e. all of the exporters). But it became increasingly less important by the early 1970s because Japanese camera/lens firms led the global industry and rivalry among them intensified. P. B. Stone wrote in 1969 (p. 73) that "Japanese camera makers are in a position which is at once both embarrassing and funny to behold. They have cleaned up the world market and most of them simply don't know what to do next." Japanese camera production reached a peak in the late 1970s, and Trevor Boon (1970, pp. 115-118) wrote for the *Financial Times* that once the Japanese camera firms reached maturity in the 1970s, production would move to countries (e.g. Hong Kong, East Germany and the Soviet Union) which could offer cheap versions of both simpler and slightly more advanced cameras.

The industry, they thought, would follow the pattern predicted by Raymond Vernon's (1966) product-cycle theory. Japanese firms would move production out of Japan to maintain cost advantage, and over time relinquish camera/lens manufacturing to other firms in favor of purchasing them on an OEM basis. The 'old' Japanese camera/lens firms would concentrate instead on developing higher-value added products. What happened instead was that Japanese camera/lens manufacturers diversified into other products with optics as their core technologies. The firms' advances in other areas (e.g. business machines, specialty cameras and optics) were continuously applied to camera/lens technologies. How and why this was done is the subject of chapter five.

Appendix 4a Five Year Growth Index of The Big Five Camera/Lens Firms in 1961 (1956=100)

	Sales	*Property*	*Number of Employees*	*Net Earnings*	*Current Assets*	*Average Wage*
Canon	333	249	259	256	281	77
Nikon	190	90	108	140	104	138
Minolta	278	177	143	326	158	121
Ricoh	456	873	295	960	1046	123
Olympus	217	195	135	168	174	115

Note: Nikon was Nippon Kogaku and Ricoh was Rikken Kogaku at this time.

Source: JCIA, *Annual Report 1962*, Tokyo, JCIA, p.1 as cited in A. Miyabayashi (1963) "Japanese Camera Exports to the United States: A Case Study in Development and Competition," MBA Thesis, City College of New York, June, p. 82.

Appendix 4b European Sales Offices Established by Japanese Photography Firms, 1961-1983

Year Est.	Name of Office	Country	Other Functions
1961	Nikon AG	Switzerland	
1962	Asahi Optical Europe, N.V.	Belgium	Imports, Rep. Office
	Yashica Europe GmbH	WG (Hamburg)	Imports
1963	Canon Optics S.A.	Switzerland	
	Olympus Optical Europe GmbH	WG (Hamburg)	
1965	Minolta Camera Handelsges. mbH	WG (Hamburg)	Imports
	Minolta (Schweiz) GmbH	Switzerland	
1966	Sankyo Europe Export & Import GmbH	WG (Dusseldorf)	
1967	Fuji Photo Film (Europe) GmbH	WG (Dusseldorf)	
	Pentax Handelsgesellschaft mbH	WG (Hamburg)	
1968	Canon Amsterdam B.V.	Netherlands	Imports, Rep. Office
	Nikon Europe B.V.	Netherlands	Imports, Rep. Office
1969	Copal Europe GmbH*	WG (Hamburg)	
	Ricoh Nederland B.V.	Netherlands	Representative Office
1970	Canon Svenska AB	Sweden	
	Elmo (Europe) GmbH	WG (Dusseldorf)	Representative Office
1971	Yashica Handelsges. mbH	Austria	
1972	Canon France S.A.	France	
	Canon Italy S.P.A.	Italy	
	Nikon GnbH	WG (Dusseldorf)	
1973	Konishiroku Photo Ind. (Europe) GmbH	WG (Hamburg)	Representative Office
	Minolta Vertriebsges. mbH	Austria	
1974	Chinon Vertriebsges. mbH Deutschland	WG (Neurenberg)	Representative Office
	Olympus Optical AB	Sweden	
1975	Canon GmbH	Austria	
	Minolta France	France	
	Olympus Optical Co. (UK) Ltd.	UK	
	Yashica AG	Switzerland	
1976	Canon UK Ltd. Camera Division	UK	
	Fuji mex Ltd.	UK	
	Olympus Optical Co., GmbH Wien	Austria	
	Olympus Nederland B.V.	Netherlands	
	Sankyo Seiki (Schweiz) AG	Switzerland	
1977	Konishiroku Photo Ind. UK Branch	UK	
1978	Minolta Nederland B.V.	Netherlands	
	Ricoh Deutschland GmbH	WG (Frankfurt)	
1979	Nikon UK Ltd.	UK	
	Pentax UK Ltd. Pentax House	UK	
	Sigma Deutschland GmbH	WG (Frankfurt)	
1980	Oy Canon	Finland	
	Dansk Fuji Film A/S	Denmark	
	Minolta UK Ltd.	UK	
	Yashica Svenska AB	Sweden	
1981	Pentax France S.A.	France	
1982	Minolta Svenska AB	Sweden	
	Pentax Svenska AB	Sweden	
	Pentax (Schweiz) AG	Switzerland	
	Tamron Vertriebsges, mbH	WG (Frankfurt)	Office with Sigma
1983	Asahi Pentax Nederland B.V.	Netherlands	

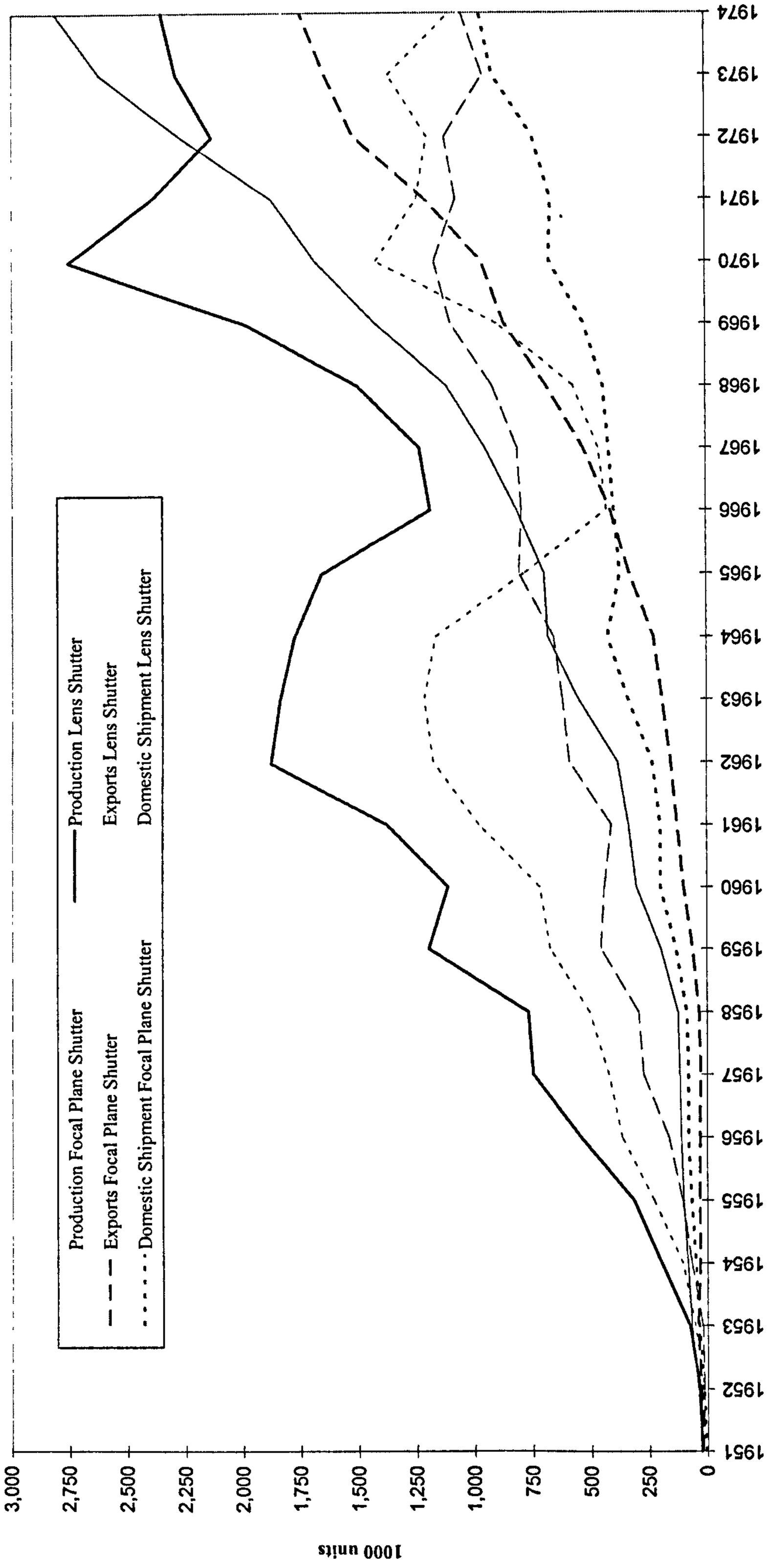
Source: JCII (1984) *Sekai no Nihon Kamera* (The Global Japanese Camera), Tokyo, JCII, pp. 438-440.

Appendix 4c Retail Price Index of Consumer Goods by Item, 1955-1960 (1955=100)

	Cameras	*Auto-mobiles*	*Bicycles*	*Electric Fans*	*Electric Irons*	*Radios*	*Refrig-erators*	*Sewing Machines*	*Tele-visions*	*Washing Machines*	*Watches*
1955	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1956	92.9	93.7	102.3	103.1	114.2	89.9	94.2	110.0	77.5	89.2	100.0
1957	87.1	85.2	103.4	78.1	128.5	97.1	96.7	100.0	68.9	84.1	100.0
1958	76.2	82.0	103.4	112.6	128.5	92.8	88.7	100.0	62.0	83.9	100.0
1959	67.7	80.4	104.6	106.3	142.9	81.2	81.7	100.0	56.4	83.9	100.0
1960	65.0	74.4	106.0	103.1	142.9	78.3	79.9	100.0	50.8	83.9	100.0

Source: M. Seki, M. Takeuchi & H. Yaguchi (1961) *Kamera Fuirumu* (Camera and Film), Tokyo, Yugenkaku, p. 12, based on Prices White Paper data.

Appendix 4d Japan's Total Production, Exports and Domestic Shipment of 35 mm Cameras (Quantity), 1951-1974



Figures are from JCIA statistics and include those produced by overseas subsidiaries of JCIA member companies.
Source: JCIA (1987) *Nihon Kamera Kogyo-shi* (The History of the Japanese Camera Industry), Tokyo, JCIA, p. 376-378.

Appendix 4e

Growth Indicies for Eleven Camera Manufacturers and Average Monthly Wages, Fiscal Years 1966-1975[a] (FY1966=100, thousands of yen)

	Aggregate Sales	*Operating Profit (Loss)*	*Working Capital*	*Owned Capital*	*Tangible Fixed Assets*[b]	*Value Added*	*Number of Employees*	*Average Monthly Wages*[c]
1966	100.0	100.0	100.0	100.0	100.0	100.0	100.0	55
1967	120.9	168.5	109.3	116.4	111.4	122.2	100.7	65
1968	147.5	219.4	124.6	137.9	125.0	149.0	105.4	76
1969	202.4	348.1	164.4	180.2	160.3	201.4	111.5	90
1970	251.2	419.0	212.4	252.3	204.6	246.3	116.0	108
1971	267.4	245.4	242.3	267.1	234.7	238.3	122.2	115
1972	315.2	281.2	274.6	290.4	261.7	264.8	123.7	130
1973	391.1	399.2	345.1	345.0	298.2	341.1	122.3	167
1974	442.0	240.2	397.6	367.1	333.8	399.6	121.4	212
1975	474.1	279.4	419.3	380.4	350.9	411.7	115.6	221

Note: [a] The fiscal year begins on 1 April.
[b] Acquisition cost.
[c] Wages not presented as an index.

Source: MITI (1978) *Sangyo Kikai Soran*, Industrial Machinery Section, Information Machinery Industry Division, "Shashinki," p. 416.

5. Going Global

Introduction

Competition among Japanese photography firms took place in an increasingly global marketplace by the end of the 1950 to 1973 period. The decade of the 1970s brought about many changes in world markets. First the postwar expansion came to an end with the collapse of the international monetary regime in 1971 and the first oil crisis in 1973. Trade barriers among the industrialized nations were lowered from the 1960s which raised levels of economic interdependence among nations through trade. With that came the rise of the multinational corporation, led at first by American firms that exploited the lower costs of overseas production. In the 1980s, multinationals 'globalized' international business (cf. Dunning, 1993).

In Japan, the era of high-speed growth came to an end in the early 1970s as the nation faced its first postwar appreciation of the yen and economic restructuring to cut its dependence on Middle East oil (cf. Lincoln, 1988; Nakamura, 1981). The new floating exchange system meant that the era of undervalued Japanese exports was over (cf. Tsuru, 1996). Firms had to find new ways to stay competitive international markets, and they did this through continuously raising quality and implementing better management of manufacturing processes. Japanese camera/lens *and* film makers became world leaders and followed the trend of globalizing their business, especially after 1980 (JCIA, 1987). How the Japanese photographic firms went global and how their behavior was affected by their relationships with the government and with their competitors worldwide is the subject of this chapter.

As discussed in chapter four, Japanese firms dominated world production of cameras and lenses by the late 1960s. Japanese goods gained

popularity and market shares first in the US in the 1950s and then in Western Europe, which until the 1960s was dominated by West German firms. In 1961, Japan controlled 40 percent total world trade in cameras, and more than 40 percent of Japanese camera exports went to the US market (Miyabayashi, 1963, pp. 127-128). By 1974, world camera capacity was divided among the US at 49 percent ($7.4 billion), Europe at 24 percent ($3.6 billion) and Japan at 27 percent ($4 billion), but Japanese firms were the clear technological and market leaders in the 35 mm format (JCII, 1984, p. 310).

During the 1950s, Japanese camera/lens firms pursued export promotion to the US, the largest market for photographic products, and US market access was helped by sales to US military post exchanges (PXs) (see chapter three). The PX 'exports' earned foreign exchange (i.e. US dollars) which helped cover the cost of Japan's imports and reduced Japan's economic dependence on the US government. American security policy also favored building a strong Japanese economy which could act as a bulwark against the rise of Communism in East Asia. Japanese camera/lens exporters became heavily dependent on US sales, and by the end of the 1950s, looked to European markets to expand exports. Following the 'one agent per country' system described in chapter four, firms set up distribution networks in all major European markets. As trade barriers fell throughout Europe and distribution improved, Japanese camera/lens firms entered head-to-head competition with their traditional rivals in West Germany.

High-quality Japanese cameras and lenses satisfied the expanding demand for reasonably-priced, mass-market goods among consumers in industrialized countries who had more disposable income and leisure time than ever before. Mass production helped Japanese camera/lens firms keep prices low, and this trend continued throughout the 1970s and 1980s; standardized, modular parts and integrated circuits (ICs) meant that fewer moving parts became the norm. Manufacturing was made easier and lower-skilled labor could be used to produce modern, compact cameras and even

more technologically-advanced cameras and lenses. Quality was consistently raised through the use of computer-aided lens design which also reduced the time needed to manufacture lenses and increased levels of focusing precision. West German firms continued to rely on traditional, hand-made production methods for cameras and lenses which kept retail prices high. They therefore came to occupy the niche for professional photographers.

Export prices of the Japanese goods were also kept low because of the stable exchange rate from 1949 to 1971 of 360 yen to one US dollar. This helped Japanese firms compete against West German firms in the 35 mm format first in the US market and then in European markets. Despite pressure revalue the yen-dollar exchange rate throughout the late 1960s, the Japanese government cleverly avoided doing so by playing off of American security fears in East Asia first in Northeast Asia (i.e. China and the Koreas) and later in Southeast Asia (i.e. Vietnam). It was impossible to be sure in the 1960s that what appeared to be positive growth in Japan -- in terms of exports as well -- was not merely a streak of good luck. American military security in East Asia and general insecurity about Japan's future economic potential worked in favor of Japanese exporting firms because they enjoyed increasingly favorable terms of trade over the 1949 to 1971 period. After 1971, however, new methods of maintaining competitiveness had to be found (see below).

Export promotion of cameras and lenses and the institutions that supported it (e.g. Japan Camera Industry Association (JCIA), the Japan Machinery Design Center (JMDC) and the Japan Camera and Optical Instruments Inspection and Testing Institute (JCII)) had begun to reach the limits of their usefulness to the camera/lens firms by the early 1970s.[1] The JCIA, the JMDC and JCII served two crucial functions in terms of export promotion: they insured that the standards of Japanese export goods were high and helped exporters build overseas markets. Before 1973, the JCII

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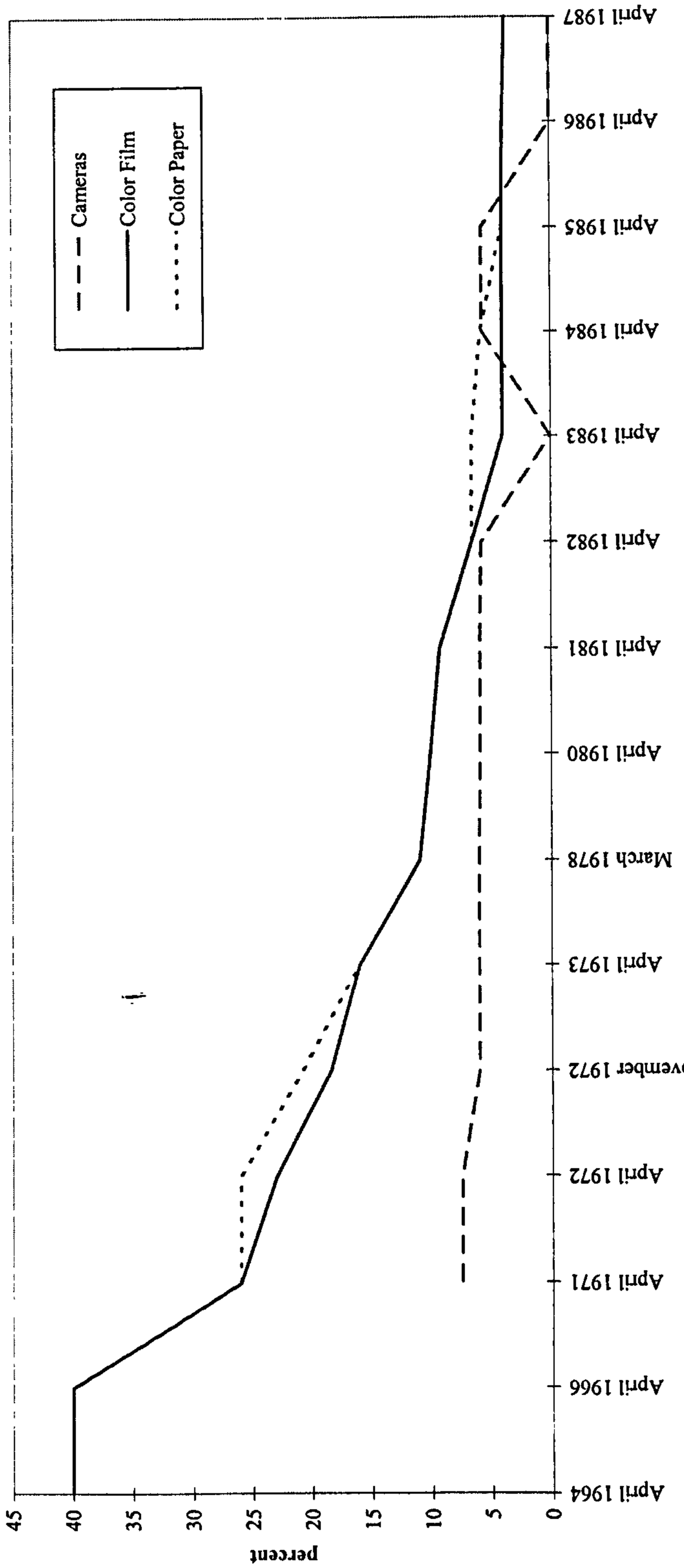
[1] The official name of the Japan Camera Inspection Institute (JCII) changed in May 1973, but the acronym stayed the same (Lewis, 1991, p. 77).

conducted market surveys, set industry standards, and developed so-called 'public relations.' The last involved creating an image of high quality Japanese goods, effective customer service and fair trade, sponsoring camera shows, initiating multilateral industry 'summits' on the direction the global industry should take and generally working to softened criticism of Japanese trading practices. But these market-building services became less interesting to the Japanese camera/lens exporters once they had established themselves in American and European markets.

After 1973, Japan's economic structure, the international trading regime and the relationship of the photography firms to the government changed. As noted in chapter four, the 1950 to 1973 period is characterized more by cooperation between industry and government and less by rivalry. Camera/lens exporters raised the level of competition with one another in an increasingly globalized market and the changing value of the yen put pressure on firms to keep production costs low so they could defend their world market shares. The result was that firm-firm rivalry among the leading Japanese camera/lens makers grew. Relations with the Japanese government became less important, especially for those firms that became more dependent on global sales than on the Japanese market. (This is discussed in more detail below.)

On the photographic film side, the situation was very different. There are only two photographic film makers, Konica and Fuji Photo Film, making for an oligopolistic market in Japan. The camera/lens makers also have an oligopoly, although it is with many firms (cf. Encarnation, 1992). Photographic film manufacturing is quite different from that of cameras/lenses, because film requires substantial investment in manufacturing capacity and high levels of R&D to achieve economies of scale, technological consistency and reliability of the product. And, because Kodak enjoyed a dominant position in world markets for so long, only a few firms were willing to enter the market for photographic film.



Graph 5.1 Japan's Import Tariff Reductions on Photographic Goods, 1964-1987

Notes: Cameras includes still and movie cameras. The rate on movie cameras dropped from 10 to 5 and then to 4 percent in April and November 1972.
In April 1983, the camera tariff was eliminated on 35mm cameras only.

Sources: JCII (1984) *Sekai no Nihon Kamera* (The Global Japanese Camera), Tokyo, JCII, pp. 565-613; JCIA (1994) *Nihon Kamera Kogyo 10-nen no Ayumi* (A 10-Year History of the Japanese Camera Industry), Tokyo, JCIA, p. 36; JCIA (1987) *Nihon Kamera Kogyo-shi* (The History of the Japanese Camera Industry), Tokyo, JCIA, pp. 304-329; 368.

Japan's producers of photographic film (and photographic paper) supplied a captive domestic market until the early 1970s, because it was closed to imported film through quotas and import tariffs and to foreign competition due to foreign capital controls (cf. Mason, 1992). Import quotas on color photographic film were dropped in 1971, and tariffs on photographic film and paper were gradually reduced throughout the 1970s and 1980s (see graph 5.1). At the same time Japan's direct investment restrictions were lifted and when Kodak Japan was set up in 1977, the market was opened up to global competition. However, informal barriers, i.e. non-tariff barriers, through the distribution system were set in place, and aggressively controlled especially by Fuji Photo Film. Fuji used distribution to guarantee retail shelf space for their photographic film and paper and employed incentives for wholesalers and retailers to prioritize sales of Fuji's products. Such distribution arrangements allowed Fuji to enjoy 70 percent market share in Japan by 1995, while Konica held 20 percent and the remaining ten percent was divided between Kodak and Agfa at seven and three percent respectively. The details of how the photography industry, i.e. camera/lens and film makers, went global and how firm-firm rivalry increased, while government-industry cooperation decreased over the 1974 to 1995 period is presented in the following pages.

Export promotion, import protection and film

The Japanese photographic film manufacturers trailed their competitors in the US and West Germany on a technological level throughout the 1950 to 1974 period and did not begin to close the gap until the 1980s. As described in chapter three, the market leader, Kodak of the US, dominated the industry by periodically introducing new film formats and cameras to go with them. Camera/lens manufacturers that tried to introduce new cameras based on film

formats not supported or prioritized by Kodak were usually forced to withdraw and remodel the cameras to suit the supply of Kodak film.

Kodak's success in consumer photographic film may have been helped by 'first mover' advantages and by the firm's dominance in the professional market, i.e. supplying movie film stock to Hollywood studios. As a first mover, Kodak built a reputation from the late 1880s onwards for reliable, high-quality photographic film supplied in limitless quantities. According to Chandler (1988, pp. 492-494), the advantage gained early by a first mover, such as Kodak, is through extensive investment in manufacturing, distribution, and management (and in Kodak's case research) which allows the firm to corner the market and raise the barriers to entry for would-be challengers. Managerial talent and organization is crucial for managing firms built for scale and scope production. Kodak did all of these and successfully retained its technological position by defending its extensive web of patents (Brayer, 1996; Jenkins, 1975). The firm expanded its market position through horizontal integration at first (until US antitrust laws ended that strategy) and then through vertical integration (see chapter three).

Although Kodak has led the industry throughout most of the twentieth century, its Kodachrome color film system (introduced as movie film in 1935, sheet film in 1938 and negative color roll film in 1941) did not become the industry standard.[2] Instead, Agfacolor Neu of 1936 developed by Agfa (Germany), Kodak's most formidable competitor until WWII, set the standard.[3] According to Helmut Gernsheim (1986, p. 28), since 1950, all

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[2] Kodachrome film was developed by two American musicians, Leopold Godowsky and Leopold Mannes, and scientists at the Kodak Research Park. According to Gernsheim (1986, p. 28) "three layers of emulsion are coated on film support...The top layer is sensitive only to blue light, the middle layer to green and the bottom layer to red. [...] After development the residual silver bromide in each layer is re-exposed and independently developed in coupler developers...Different coupler developers are therefore used for each layer, and after dissolving away the positive silver image a subtractive colour photograph of yellow, magenta, and cyan (blue-green) dyes remains." Naomi Rosenblum (1984, p. 607) describes the Kodachrome process as a chromogenic type using the dye-injection method.

[3] Rosenblum (1984, p. 606) describes Agfacolor Neu as a "three-layer film in which color couplers were incorporated in the layers and released during development; this enables the

leading photographic firms have marketed color film under their own brand names, and all are "more or less based on the Agfacolor patent which, as an enemy invention, became available to the allied powers."[4] Ansco (US), for example, introduced its Anscocolor film (based on the Agfacolor process) in 1942 and Konica introduced Sakura Color 35 mm film one year earlier. The exceptions to the Agfacolor/Kodachrome processes are Polaroid color film of 1963 which is both the film and the print in one and the Polaroid SX 70 instant color film which develops automatically in natural light.

Agfa lost its prewar technological advantage vis-à-vis Kodak and the firm also lost market share during and after WWII to, among others, Kodak and Polaroid of the US, Gevaert of Belgium, Ilford of the UK, Pathé of France and Konica and Fuji of Japan. But Kodak remained the postwar market leader. During the early 1960s, many American and European firms merged due to the American 'invasion' of capital into Europe (cf. Spero, 1990). In 1963, Ilford became part of the ICI, and the following year, 3M (US) bought Ferrania (Italy) and Agfa merged with Gevaert. Later, Agfa was absorbed into the Bayer Group. Competition in Europe to Kodak's dominance came mainly from Agfa throughout the postwar period, while other European firms concentrated on narrow specializations, e.g. Ilford in black and white film.

In 1945, Japanese photographic film firms lagged behind the world market leaders largely due to the domestic chemical industry. However, firms made strides throughout the 1950s in the production of photographic film, sensitized paper and dry plates (see appendix 5a). In 1959 production value, Fuji Photo Film was the largest — three times larger than its Japanese rival Konica — of the four leading Photo-Sensitive Materials Industry Association (PSMA) members, the other two being Mitsubishi and Oriental. Fuji's sales

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film to be processed in individual darkrooms." It is a chromogenic type process using the dye-incorporation method found in most color papers and films (p. 607).

[4] Gernsheim (1986, p. 28) notes that three firms (one each American, British and Japanese) brought out film on the Kodachrome principle, but does not specify which ones. Nishimura states that Konica experimented with both the Agfacolor and Kodachrome processes, bringing out both types in 1941 (Konica, 1987, pp. 15, 34).

breakdown for fiscal year 1958 indicate that 72 percent of the firm's profits came from photographic film sales, while the next two largest profit centers were sensitized paper and cameras/lenses at roughly nine percent each (Fuji Photo Film, 1959, introductory data).

On an international scale, Japanese firms were quite small. In terms of assets, number of employees, output and sales, Kodak was from eight to over 40 times larger than Fuji Photo Film in 1959 (see table 5.1). Average figures for American and Japanese firms' profitability, indicate that the size differential between the two firms was unusually large, the average American firm being roughly twice the size of the average Japanese firm. It should be noted that the figures are presented in yen at the 1949 yen-dollar exchange rate which by 1959 was generally perceived of as undervaluing the yen.

US-Japan comparisons of firm size can be misleading because firms in Japan and America are organized differently. The vast majority of Japanese firms are single-product or dominant-product firms (Fruin, 1992). Over the postwar period, Japanese firms have generally not grown in size; they have instead developed extensive inter-firm relationships for their vertical supplier and distributor networks, i.e. the *keiretsuka* or keiretsu-ization of business in Japan (Gerlach, 1992). According to Mark Fruin (1992, p. 23), Japanese

> [f]irms remain small and concentrated in particular market niches because focal factories excel at full-product line diversification while interfirm networks manage product and markets outside the focalized scope of single- and related-product firms.

A Japanese firm such as Fuji Photo Film therefore has its own supplier and/or distribution networks in the form of a vertical *keiretsu*, that is, smaller firms that have regular business relationships with Fuji, the larger 'parent' firm (Gerlach, 1992). An American firm such as Kodak is vertically integrated with control over the whole production process from raw materials to finished product, and usually relies on a multidivisional management structure

Table 5.1 Comparison of Eastman Kodak and Fuji Photo Film, 1959 and Average Profitability Ratios for the US and Japan (billion yen, percent)

	Capital Stock	*Number of Employees*	*Working Capital*	*Annual Sales*		
				Sensitized Materials	*Other Goods*	*Total*
Eastman Kodak (A)	105.7	46,200	288.5	214.1	115.0	329.1
Fuji Photo Film (B)	2.5	5,833	16.0	14.4	2.8	17.2
Ratio of A/B	42.3	7.9	18.0	14.9	41.1	19.1

	Capital Profitability Ratio (Manufacturing Avg.)	*Sales Profitability Ratio*
US Avg. (A)	14.7	12.0
Japanese Avg. (B)	6.2	6.4
Ratio of A/B	2.4	1.9

Source: M. Seki, M. Takeuchi & H. Yaguchi (1961) *Kamera Fuirumu*, Tokyo, Yugenkaku, p. 108.

(Jenkins, 1975; Chandler, 1988). A vertically-integrated corporation is larger in every respect than a firm with vertical *keiretsu*. (See below on distribution *keiretsu* in film and horizontal *keiretsu*.)

Fuji Photo Film's success in the Japanese market can be attributed to its prewar history of close cooperation with the Japanese government on the domestic supply of photographic products, especially film and paper. Throughout the prewar years, Fuji benefited from the government's policy of *kokusanka* (i.e. domestic manufacture) of photographic film, and from the support of Dai-Nippon Celluloid and thereby the Mitsui *zaibatsu* in achieving that goal (Fuji Photo Film, 1959, pp. 7, 21, 37) (see also chapter three). Konica began producing photographic film in 1929, five years before Fuji Photo Film's establishment. Dai-Nippon Celluloid (established in 1919) was in the late 1920s the only Japanese firm that made film base (Fuji Photo Film, 1959, p. 6). But by 1938, both Fuji Photo Film and Konica made base film as part of the government's push for *kokusanka* of photographic paper and film (JCIA, 1987, p. 174).

According to Ryousuke Nishimura, former president of Konica, the Osaka Experimental Center of Engineering played an important role in advancing Japan's fledgling sensitized materials industry in the late 1920s (Konica, 1987, p. 34). The Japanese government invited Dr. Max Leo, chief engineer of the Erneman Dry Plate Works in Germany, to work at the Center between 1927 and 1930 on developing photographic emulsion techniques. Many engineers who worked on the project, including Nishimura, were recruited into Japanese photography firms, thereby spreading the knowledge that had been developed at the Center to the firms.[5]

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[5] In the late 1920s, Japan's photography firms working in sensitized materials (i.e. film and paper) manufacture were Konica, Oriental Photo Industry (established in 1919), Toyo Dry Plates (1919 and in 1934 absorbed into the new firm Fuji Photo Film), Asahi Photo Industry (1925) and Nippon Photo Industry (1926) (Fuji Photo Film, 1959, p. 7). By 1938, an additional five firms, including Fuji, had joined the industry (JCIA, 1987, p. 174). Asahi Photo Industry which introduced Japan's first photographic film, Kiku, went bankrupt in 1943 (Konica, 1987, p. 34).

As mentioned above, Japanese photographic film manufacturers were protected from foreign competition in the Japanese market during the post-war years until the early 1970s and the onset of capital and trade deregulation. Protection was designed to prevent dependence on imported film, and to secure a dependable and low-priced supply of film to the domestic market. As noted in chapter one, the development in Japan of internationally-renowned cameras and lenses stimulated demand for photographic film. Since the photographic film industry had been established as part of the government's *kokusanka* policy in the prewar period, it was not unexpected that photographic film manufacturing would be nurtured in the early postwar period.

After the early 1960s when Japan joined the GATT, the OECD and the IMF, the Japanese government's direct controls over the economy and industry to stimulate postwar economic recovery began to wane. This also meant relaxing the tools of the 'developmental state,' e.g. Japan's industrial policy for export promotion that had been so effective during the period of high-speed growth (cf. Johnson, 1982; Johnson, 1995; Nakamura 1981; and Tsuru, 1996). But change did not come immediately for the makers of photographic film. Although quotas on color film imports were lifted in 1971, import tariffs remained high at 26 percent (see graph 5.1).

In the late 1960s, Kinji Moriyama, the camera/lens firms' *zoku* politician, urged that film be opened up to international competition by lowering import tariffs (Yayama and Ito, 1988, p. 340). Photographic film makers, especially Fuji Photo Film, did not support his position. They believed that the industry still needed tariff protection so that it could catch up technologically to Kodak in the manufacture of high-quality color film (Kobayashi, 1970). The four leading Japanese sensitized materials (i.e. photographic film and paper) makers (i.e. Fuji Photo Film, Konica, Mitsubishi Paper and Oriental) held only seven percent of the world market in 1969 while Kodak held a full 75 percent, argued the president of Fuji Photo Film,

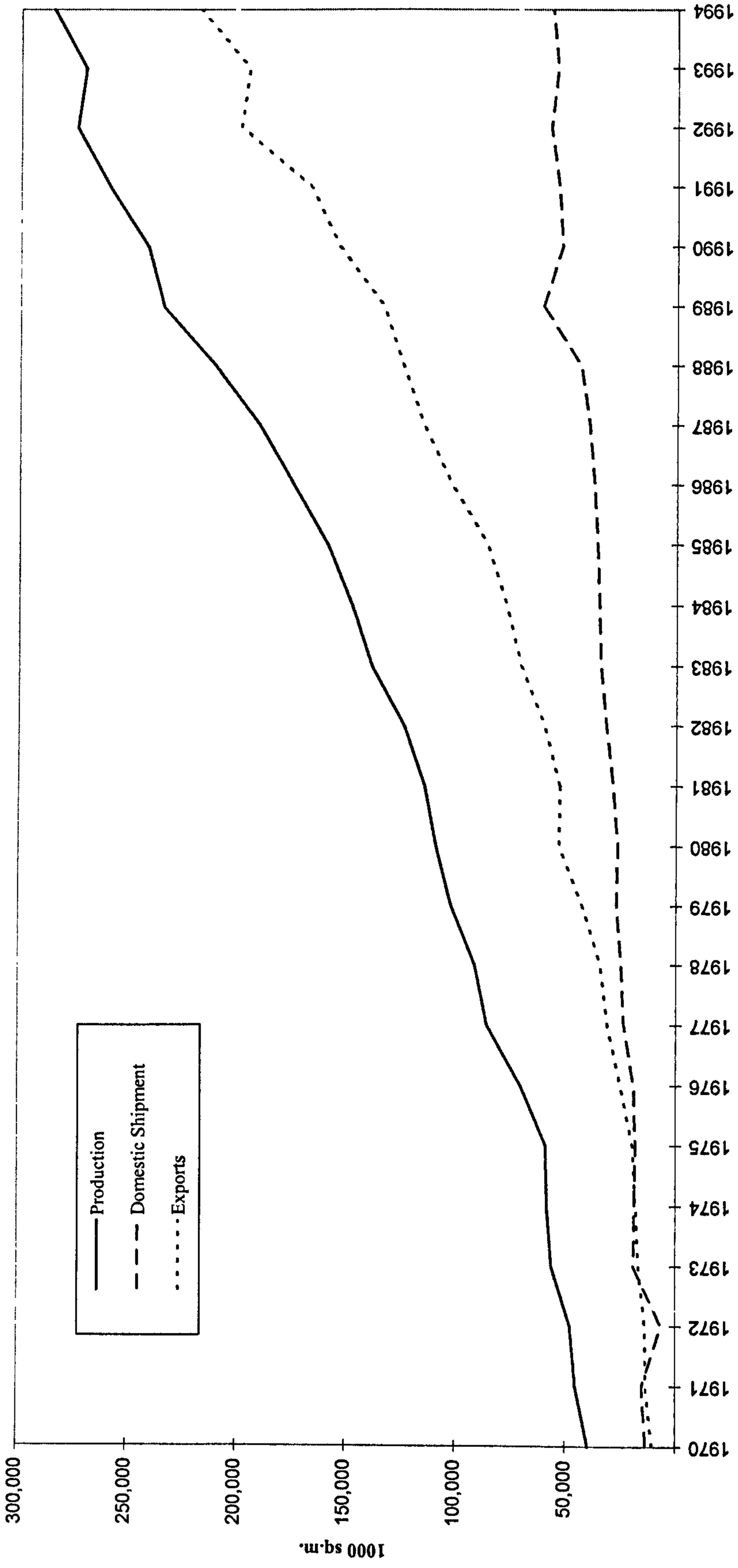
Setsutaro Kobayashi in 1970 (p. 19). This was quite different from the situation in cameras/lenses where Japanese firms dominated world markets by that time.

Sakae Haruki (former president of Fuji Photo Film) had successfully argued a decade before Kobayashi that imports of sensitized materials to Japan had to be prevented so that exports could be promoted and firms would be allowed to catch up with Kodak (1959, pp. 13-14). The fear among the Japanese photographic film makers was that in an open market, the leading Japanese firms would be swallowed up by world leaders Kodak and Agfa. In the early 1970s, however, Moriyama's view prevailed, although at first he did not enjoy the full support of Ministry of International Trade and Industry (MITI) officials (JCII, 1984, pp. 255-263). But gradually MITI and the Ministry of Finance (MoF) gave in when Kodak began to push hard to lower Japan's import tariffs particularly on 35 mm amateur color roll film in the early 1970s.

As Japanese import tariffs fell, production of photographic film (i.e. color roll film, black and white film and X-ray film) in Japan rose (see graphs 5.2 and 5.3). In terms of quantity, exports of Japanese photographic film rose steadily after 1975, while domestic shipments (not including imports) increased only gradually. In value terms, however, the domestic and export sales follow roughly the same trend. The figures imply that Japan's prices of photographic film have been higher than export prices since the 1970s, and therefore revenues from domestic market sales are very important to the two Japanese photographic film makers, Fuji Photo Film and Konica.

The breakdown in value of Japan's total photographic film production, domestic shipment and exports indicates that of the three film products (i.e. color roll, black and white roll and X-ray), color roll film accounts for nearly half of all sales (see graph 5.4). In fact, the value of color roll film exports rose faster than for either black and white or X-ray film exports since 1980 (JCIA, 1995, pp. 56, 62). Naturally, there has been a corresponding rise in number of pictures taken in Japan and elsewhere, and over 97 percent of those taken in

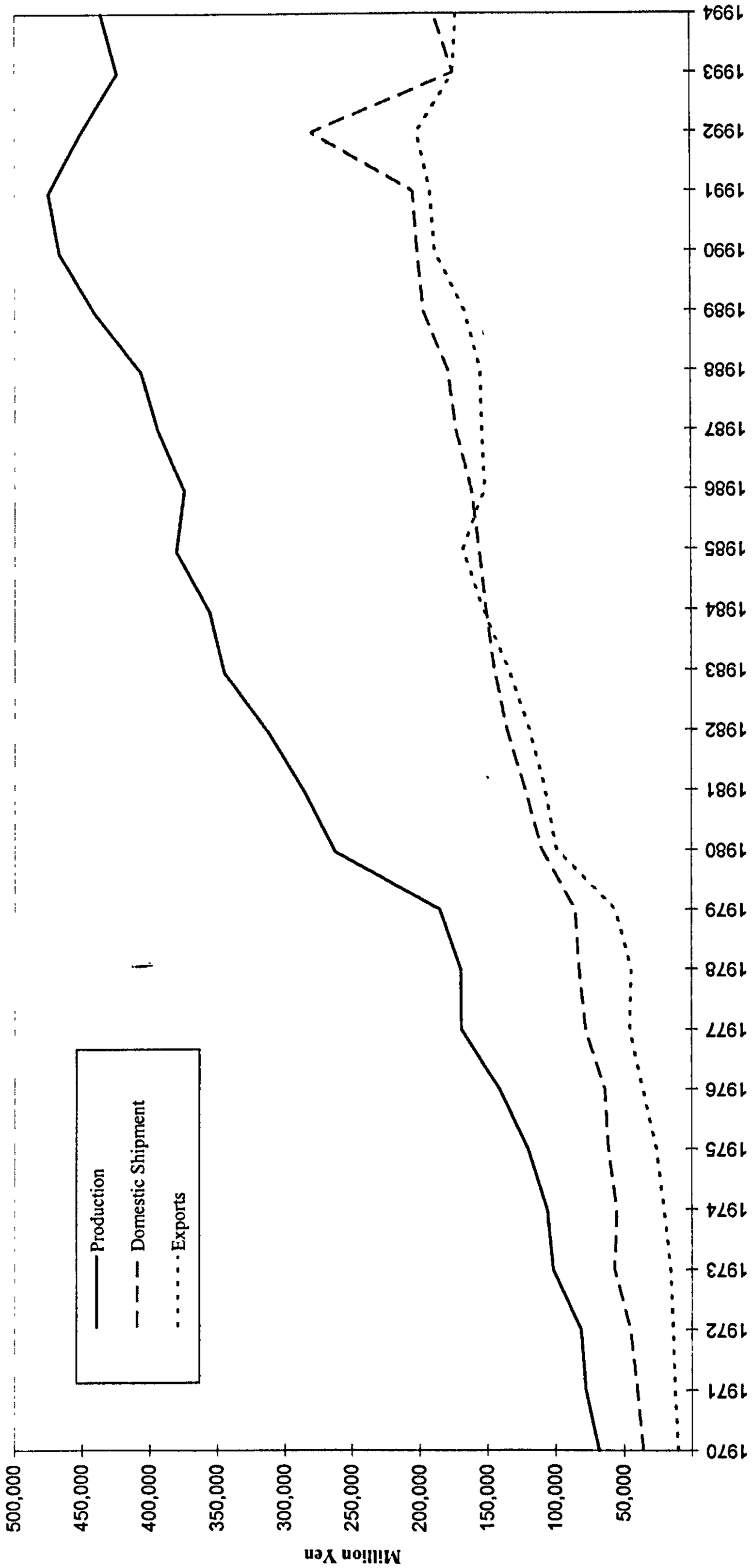
Graph 5.2 Japan's Production, Exports and Domestic Shipment of Photographic Film (Quantity), 1970-1994



Domestic shipment excludes imports. Figures include disposable cameras from 1992.

Source: JCIA (1995) *JCIA Report 95*, Tokyo, JCIA, pp. 54-56; JCIA (1990) *JCIA Report 90*, pp. 58-60.

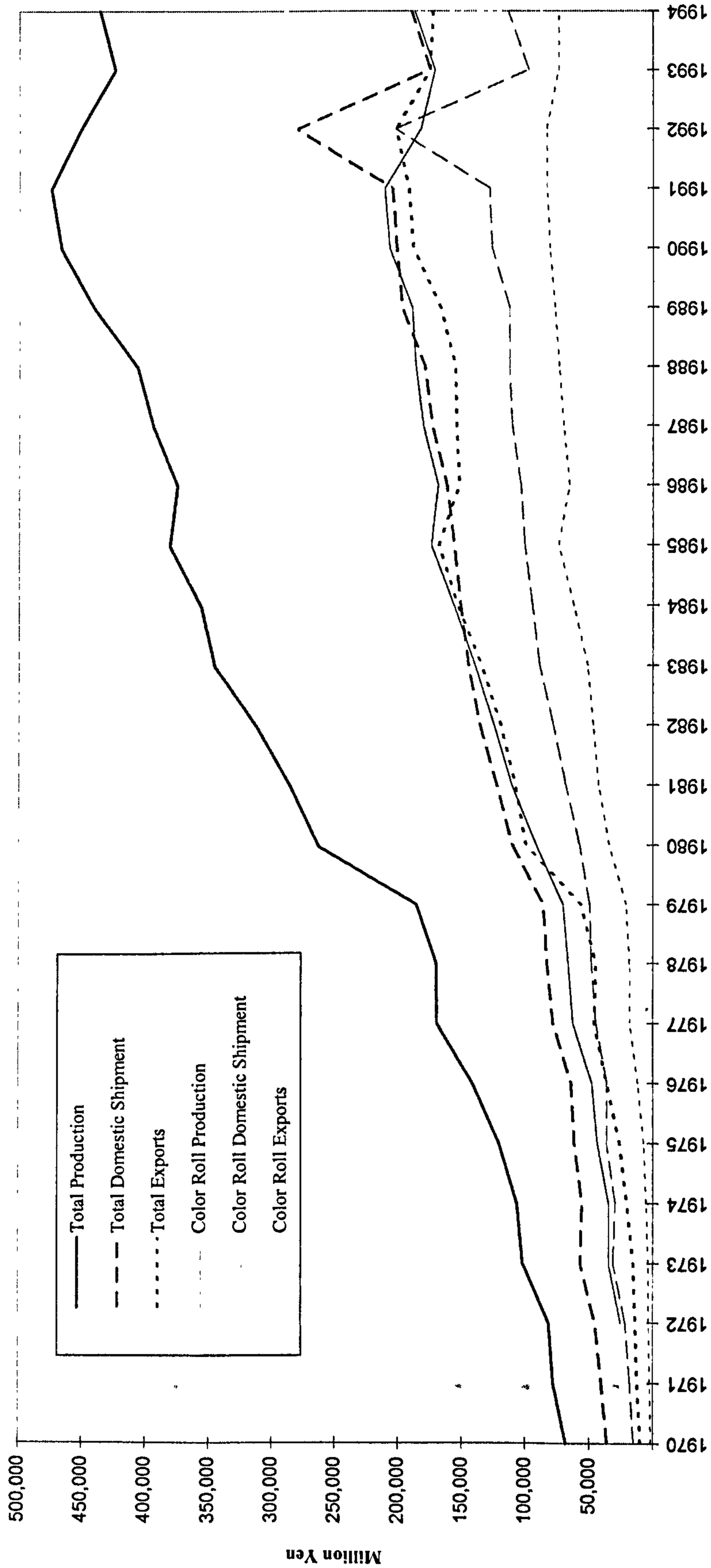
Graph 5.3 Japan's Production, Exports and Domestic Shipment of Photographic Film (Value), 1970-1994



Domestic shipment excludes imports. Figures include disposable cameras from 1992.

Source: JCIA (1995) *JCIA Report 95*, Tokyo, JCIA, pp. 54-56; JCIA (1990) *JCIA Report 90*, pp. 58-60.

Graph 5.4
Japan's Production, Exports & Domestic Shipment of Photographic Film & Color Roll Film (Value), 1970-94



Domestic Shipment excludes imported film.
Disposable cameras included in total production and color roll film figures from 1992.
Source: JCIA (1995) *JCIA Report 95*, Tokyo, JCIA, pp. 54-56; JCIA (1990) *JCIA Report 90*, pp. 58-60.

Japan in 1995 were in color. Color film sales in the large US market surpassed black and white film sales by 1963 (Wolfman, 1971, p. 39). Therefore, not only are domestic sales important to the Japanese photographic film makers, color roll film sales (domestic and export) produce particularly large profits.

Exports of Japanese photography goods (i.e. cameras, lenses and film) to the US continued to expand and from the early 1970s, attracted the attention of American industry analysts. Augustus Wolfman, a photography industry consultant, editor and publisher, noted in his *1971/72 Wolfman Report* (1971, p. 4) that the US share of the world photography market dropped by roughly three percent from 1969 to 1970 while the Japanese share rose two percent. Market growth was mainly in color photographic film rather than cameras and other equipment because of their average life span and growing saturation of markets. In 1970, amateur color film (for still cameras) accounted for 70 percent of total film sales in the US, with nearly 70 percent of that figure being for 126 cartridge film. The market for 35 mm single-lens reflex (SLR) cameras was limited to photo hobbyists in the early 1970s which meant that 35 mm film sales in the US were only a small part of the market.

In 1970, Belgium (Agfa-Gevaert) supplied over 26 percent of US imports of photographic film and paper (Wolfman, 1971, p. 6), but Japanese firms took only a nominal amount. Fuji's exports to developed countries rose rapidly after 1973, up 30 percent in that year, 15 percent in 1974 and 24 percent in 1976 (JCII, 1984, pp. 469-470). In 1980, Japan's exports of color film to the US were up 96 percent on the previous year, and color film shipments by Japanese firms rose nearly 40 percent worldwide (Glazer, 1982, p. 2). Eugene Glazer wrote in a 1982 industry report (p. 2):

> More than a year ago, we concluded that the Japanese were intensifying their aggressiveness in world color film markets and were backing increased shipment levels with strong promotional campaigns. The most recent Japanese export and US import statistics for color film do not show any signs that shipment activity is slowing.

To counter the Japanese assault, Kodak raised its advertising budget for the US by 66 percent from 1979 to 1980, outspending Fuji Photo Film eight to one (Glazer, 1982, p. 3).

America's 1981 imports of color film were split among 35 mm at 35 percent, 126 cartridge at 43 percent and 110 cartridge film at 26 percent. Japanese firms, particularly Fuji Photo Film, supplied all three film formats, but according to Glazer (1982, p. 3), Japanese color film exports did much better in non-US markets since the US imported only 22 percent of total Japanese exports, or "an unusually low figure compared with those for other Japanese products." By 1982, Fuji held 10 percent of the US market, Kodak held 80 percent and the remaining 10 percent was split between 3M and Konica (JCII, 1984, p. 472). Konica did poorly at first in the US market when it used its Sakura Color brand name, but improved its position after the early 1980s with its new Konica brand name.

Kodak's strategy to counter the growing Japanese challenge in color film was the Disc format introduced in 1982, but it failed miserably (see chapter three). This was partly due to the concurrent rise in popularity of compact 35 mm lens shutter (LS) cameras which made high-quality photographs available to amateur photographers at a reasonable price (see appendix 5b). Not only were Japanese cameras and lenses world market leaders by the early 1980s, color film had also become a successful Japanese export (JCII, 1984, p. 472). In 1984, Fuji became the official photographic film sponsor of the Los Angeles Olympic Games; it was the first time in 25 years that Kodak was not chosen to be the official Olympic sponsor (Sieg, 1994, p. 12). The pressure on Kodak in its home market was mounting in the early 1980s, and the obvious strategy was to retaliate in Japan.

Barriers to entry in the Japanese market

Foreign capital controls in Japan frustrated would-be investors, such as Kodak, and prevented them from establishing sales and/or production facilities in Japan until the late 1970s (Encarnation, 1992; Mason, 1992). In 1977, Kodak established Kodak Japan with the primary purpose of getting closer to Japanese photographic film consumers and building closer relationships with suppliers and distributors in Japan (JCII, 1984, p. 463). Apparently, the investment amounted to little more than an effort to provide technical and marketing support for Nagase, Kodak's primary distributor in Japan (Dewey Ballantine, 1995, p. 6; Sieg, 1994, p. 102). Albert Sieg, president of Kodak Japan from 1984 to 1991, wrote (1994, p. 74) that the original purpose of Kodak's investment in Japan was to try and "better meet customer needs, not tangle with competitors." But Kodak developed little competitor intelligence about Fuji Photo Film and Konica, and as a result was "always in a reactive mode, responding to each wave of attack and counter attack as it rolled through the marketplace" (p. 74).

Competition in the Japanese market had grown fierce in sensitized materials by the early 1980s particularly as Fuji left Konica behind technologically (JCII, 1984, p. 466).[6] The Japanese film makers competed on price in the domestic market but this had led to 'excess competition,' bankruptcies and confusion in the market. To deal with the problem, the PSMA member firms set price ceilings, and in 1971, the firms became the focus of a JFTC raid for price fixing (Lewis, 1991, p. 136).[7] Kodak claims that price fixing continued throughout the 1970s and 1980s and that the JFTC knew about it, but did nothing (Dewey Ballantine, 1995b, pp. 124, 134-136). The figures presented in graphs 5.2 and 5.3 confirm that Japan's domestic prices

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[6] Dewey Ballantine (1995a) claims that Konica suffered from quality control problems in their photographic film and lacked market savvy.

[7] This may have been partly due to the fact that Japan's antimonopoly laws were strengthened after 1970.

were appreciably higher than export prices given the volumes that were sold in each market. (The figures for domestic shipments do not include imports.)

Kodak became frustrated in Japan in the 1980s because the market was effectively closed to competition through the distribution system. According to Sieg (1994, pp. 102-103), Kodak had been forced to limit its distribution to two firms (i.e. Kusuda and Nagase) in the early 1950s due to the Japanese government's import controls. Prior to WWII, Kodak had used a wide network of distributors and Sieg notes that when these firms were abandoned by Kodak, Fuji Photo Film took them over.

Dewey Ballantine (1995a, pp. 6, 68) notes in a report prepared for Kodak that Kodak used Nagase and Asanuma Shokai as their Japanese distributors until 1960. No mention is made of Kusuda. They say that Kodak was told by the Japanese government in 1960 to choose *one* distributor in order to control imports into Japan. Dewey Ballantine discusses how Kodak's choice (forced by the Japanese government) of Nagase over Asanuma as their main wholesaler left great bitterness among the Asanuma people.[8] (Asanuma and Konica were Japan's first agents for photographic products in Japan in the 1870s (Lewis, 1991, p. 4). Unlike Konica, Asanuma chose remain in wholesaling.)

Under Kodak's new arrangement, all wholesalers had to purchase Kodak's products through Nagase; Asanuma was one of the largest photographic goods *tokuyakuten* (wholesalers) and would have preferred to purchase directly from Kodak (Dewey Ballantine, 1995a, p. 93). Dewey Ballantine claims (p. 116) that the historic moment for Kodak came in 1975 when Asanuma was pressured to join Fuji's increasingly exclusive wholesale network, i.e. its distribution *keiretsu*. Fuji asked Asamuma to sell its new Pocket 110 system (competing with Kodak's Instamatic system) otherwise Fuji would cut off all trade with the firm. When Asanuma refused and turned to

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[8] Lewis (1991, p. 136) notes that Kodak had an exclusive relationship with Nagase in 1972. Obviously there is considerable confusion about what really happened.

Nagase (not to Kodak) to see if Kodak products could cover the loss of Fuji, Nagase did not react. Asanuma subsequently joined Fuji's vertical *keiretsu*. Dewey Ballantine blames Nagase for not informing Kodak of the situation, but Kodak was really to blame for not being pro-active enough in Japan at that time.

According to Sieg, Kodak was forced to limit the number of distributors to *two* in 1960. About that, he wrote (1994, p. 102):

> Those distributors [that were abandoned in 1960] never forgave us, even after the government eased restrictions and we attempted to expand our network; many told us in no uncertain terms that they would never work with us because of the way we treated them in the past. Instead, they stuck with Fuji and became part of one of Japan's most successful alliances.

Sieg says he realized in 1984 that if Kodak Japan were to succeed in the Japanese market, the firm would have to control its distribution system. The choice was either to set up a distribution network from scratch, which required people, organization and time (for relationship building), or to buy the existing Kodak distribution from Kusuda and Nagase's Division for Kodak Products. Kodak Japan chose the latter which Sieg (1994, p. 103) admitted "require[d] extraordinary acts of delicacy and diplomacy but really didn't have a downside" if everyone could be pleased. The arrangement with Kusuda went quickly, but it took two and one-half years to conclude the deal with Nagase.

Kodak Japan chose a typical 'Kodak' vertical integration strategy, not a typical 'Fuji' vertical *keiretsu* strategy, for its distribution in Japan (see above). If Kodak Japan had instead chosen to build up a vertical *keiretsu* from scratch, it is unlikely that Kodak's Rochester headquarters would have approved of the time or the money that such an investment would have required. And by the early 1980s, Kodak needed to make up for lost time; Japan had not been a

priority throughout most of the postwar period.[9] Kodak again took a short-term approach to the Japanese market when it closed its R&D center in Yokohama (opened in 1986 to show its commitment to the Japanese market) due to profitability concerns (cf. Sieg, 1994).

In the recent case brought by Kodak against Fuji Photo Film at the World Trade Organization (WTO), Kodak claimed that the delayed opening of the market and the locked up of the distribution *keiretsu* system made it difficult for the firm (as well as other firms) to make much headway in Japan, especially since the 1970s (Dewey Ballantine, 1997a and 1997b).[10] As noted above, Japan's domestic film market is today 70 percent controlled by Fuji Photo Film, and the remaining 30 percent is divided among Konica, Kodak and Agfa (at 20, seven and three percent respectively). According to Sieg (1994), Fuji controlled over half of the distribution of photographic film in 1984. Kodak and Agfa (and to a lesser extent Konica) therefore all faced the same problem of distribution discussed above, hence their low market shares.

One method for gaining entry into the Japanese market (i.e. to get around the distribution *keiretsu* problem) is to set up an exclusive relationship with a Japanese firm, but often this requires a compromise on the part of the non-Japanese firm (cf. Encarnation, 1992; Gerlach, 1992; Mason, 1992). For Polaroid it was a good option and in 1981 Konica obtained exclusive rights to the sales of Polaroid products in Japan (Konica, 1987, p. 30). Recently, Agfa pursued another strategy and increased its market share — mainly at Kodak and Konica's expense — by supplying Daiei, a large supermarket chain, with their own label film. The cost of gaining market share was brand recognition. The reason Fuji was not affected is its close relationship (through cross shareholding in some cases) with its entire distribution *keiretsu* (i.e.

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[9] Notes by Mark Mason from an interview with Albert Sieg in 1986.

[10] Dewey Ballantine (1995a and 1995b) and Wilkie, Farr and Gallagher (1995) are the 1995 Section 301 case which was transferred to the WTO (Dewey Ballantine 1997a and 1997b) when the Japanese government refused to negotiate on a bilateral basis (Katz, 1998).

wholesalers, retailers and labs) which ensures that Fuji film gets adequate shelf space and even marketing priority.

Japan's photographic film distribution mirrors the evolution of 'orderly' distribution in cameras/lenses in the 1960s and 1970s. The main problem in Japan for the JCIA member firms was how to maintain reasonable retail prices and secure broad distribution throughout Japan for their goods (cf. JCIA, 1987; RMKK, 1971). The aim was to prevent black markets, gray markets and price cutting, *and* most importantly that the firms stay in business. Camera/lens makers were especially concerned about price cutting because they produced their goods on very thin profit margins, and as the camera/lens technology advanced, pressure on retail prices grew (*Camerart*, June 1990).

By 1971, the camera/lens firms had established their own private sales companies to develop strong domestic distribution networks. They were: Olympus Trading, Canon Camera Sales, Cherry Trading (for Konica), Kowa Camera, Bronica Sales, Yashica Trading, Zeus Sales (for Minolta), Mirax Trading (for Miranda), and Ricoh Camera Sales (RMKK, 1971, p. 6). According to Miyabayashi (1963, p. 51), the situation in the early 1960s had been "rather confused" because (p. 54) "the sales system of the camera industry has not yet developed into an organization of exclusive affiliation." From an industry point of view, the problem was that few manufacturers had their own sales companies to deal directly with wholesalers, so a firm often dealt with only a few.[11] This meant that their products did not get the best possible visibility in the market.[12] Because there were few exclusive sales firms attached to the

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[11] Only wholesalers that belong to the Camera Wholesale Trade Association (39 members in 1963) are called *tokuyakuten*. Others called 'middlemen' (roughly 100 in 1963) acted as wholesalers but they tended to be price-cutters and were "chiefly responsible for the frequent price crashes" (Miyabayashi, 1963, p. 54).

[12] The camera/lens firms have been described as 'unusual' in their *keiretsu* group relationships (interview Spring 1996). Recall that the camera/lens firms set up their own overseas distribution in the 1950s and 1960s generally without the help of trading companies. There may be some connection between the camera/lens firms' choice of overseas and domestic distribution systems.

cameras makers (mostly due to inadequate funds) until the early 1970s, wholesalers had controlled camera/lens sales (cf. Seki *et al,* 1961). That changed, however, when the JCIA – and later the PSMA – member firms developed strong networks of distributors to varying degrees, depending on individual company strategy. Better distribution ensured that the leading firms' products retained market shares in Japan after the market was opened to foreign competition. Increased firm-firm rivalry for market share after 1974 tested the strength of each firm's distribution network.

Joint research and technological advancement

Research in cameras, lenses and film took place within firms during the 1974 to 1995 period. Up to 1973, the government and the JCIA, JCII and PSMA were involved in promoting research and developing standardization of manufacturing (see chapter four). Furthermore, the industry associations promoted cooperative research in important technological areas through MITI and other government agencies. For example, in 1952, five optical companies developed a rare earth optical glass (called F15) at Fuji Photo Film's Odawara plant, using MITI's Industrial Technology Agency financing (Lewis, 1991, p. 80). The Japan Optical Engineering Research Association established in 1962 is another example of a government-industry research association formed to promote advances in lens design and production. It folded in 1981 due to lack of interest on the part of the member firms (*Camerart,* May 1988). Early research on light meters took place at the JCIA and all members had access to improvements in the technology (JCIA, 1987). Later, advances in measuring light through photographic lenses to improve metering systems in cameras took place in the firms (i.e. Nikon and Minolta) as rivalry among the camera/lens firms heightened (see chapter one).

The repair and information services of the JCII-JCIA camera centers in New York and Okinawa in the 1950s also helped firms learn about each

others' technological advances (see chapters three and four). As long as the firms thought they had to 'export or die,' these activities were perfectly acceptable, but when competition in technology and for market shares heightened by the late 1950s, sharing research was no longer practical. This is why the light machinery centers (established in 1963 by MITI) became less important to the leading exporters of cameras/lenses in terms of product information. What is significant about the early easier flow of knowledge among firms was that it helped raise technological levels and probably encouraged the leading firms to make their own contributions to, for example, advancing optical measurement technologies.

Cooperative research projects in the 1970s were quite different from those during the early recovery years, and MITI's role in Japan's industrial development changed (cf. Johnson, 1982). No longer could MITI control the direction of Japanese industry, but seed money was still given to new research and the government set up numerous joint government-industry research projects (Fransman, 1990). Many of these helped firms invest in technologies that would have been too costly or risky for one firm to take on alone. One of the earliest large-scale research projects designed to put Japan ahead of its competitors (i.e. the US) and sponsored by MITI was the Very Large-Scale Integration (VLSI) Project from 1976 to 1980. The aim was to make computer chips that could store higher levels of information than those currently available, and in this way catch up to IBM in semiconductor technology (cf. Anchordoguy, 1989; Callon, 1995; Flamm, 1996; and Fransman, 1990).

By the early 1970s, Japan had an advantage worldwide in optics technology due to the advances made by the leading camera/lens manufacturers. This became quite useful for the advancement of semiconductor technologies since "[a]s things turned out, optical technologies also became dominant in the semiconductor production process" (Fransman, 1995, p. 16). As part of the VLSI project, advancements in photolithography

were required, but the members of the VLSI project, all electronics firms, did not have access to the technology. According to Jon Sigurdson (1986, p. 85):

> Optical engineers are needed but they are not available from the universities. Optical engineers in Japan are in fact only found in optical companies. Consequently, the integrated circuit makers do not have easy access to optical engineers and have been and still are dependent on optical companies.

Martin Fransman suggests that although photolithography was pursued as one of the technologies for VLSI fabrication, it was not favored by MITI or the project firms because of the lack of optical engineering capability outside of the camera/lens firms. Toshiba and Nikon had earlier discussed cooperation on developing photolithography for an optical step-and-repeat machine, and one was actually built by Nikon at MITI's Electrotechnical Laboratory as part of the large-scale integration project (Flamm, 1996, p. 62 note 75; Fransman, 1990, pp. 69-71). Later the machine's design was used by Nikon to produce the first commercial wafer stepper system for IC production.

For the VLSI project, Canon and Nikon were subcontracted as equipment suppliers and the first two now dominate the world market for optical semiconductor equipment (Flamm, 1996, p. 105; Fransman, 1995, p. 163; Sigurdson, 1986, p. 120). Kenneth Flamm (1996), Fransman (1990) and Sigurdson (1986) agree that the VLSI project resulted in benefits beyond what was expected. It created synergy between the firms that possessed the core technologies of electronics (i.e. Fujitsu, Hitachi, Mitsubishi Electric, NEC and Toshiba) and optics (i.e. Canon and Nikon) and created inter-firm links between the users and suppliers of IC equipment. Subsequent government-industry projects served to reinforce these bonds, e.g. Optoelectronics, 1979-1986, for optical semiconductors, SORTEC, 1986-1996, for synchron lithography, and Optoelectronics Devices, 1986-1996, again for optical semiconductors (Miyazaki, 1995, p. 62; OECD, 1993, pp. 75-82; Stowsky, 1989, p. 255).

Another spillover effect of the project was to raise the level of technology in cameras/lenses. Consumers are only willing to pay a certain amount for a camera in the mass market range, but the firms continued to produce more advanced mass-market cameras throughout the 1970s and 1980s (cf. JCIA, 1990 and 1995). The Japanese camera/lens companies concentrated on mass production to keep costs down. Sizable investments in capital equipment also allowed prices to fall, and as markets grew, volume production helped keep costs down.

Canon was the first of the camera/lens exporters to diversify its product line (at first unsuccessfully in electronic calculators) with the aim of insulating the company against fluctuations in demand for cameras/lenses in Japan and export markets (Canon, 1994). Other firms also realized by the early 1970s that they needed to diversify their product lines to avoid getting squeezed when markets for cameras and lenses became saturated. They pursued "full product-line diversification" in Fruin's (1992) words, using optics as their core technology for their new office products (e.g. facsimiles and photocopiers) and medical optics (e.g. endoscopes and gastrocameras).

Canon which developed the plain paper copier in the early 1960s competes with Ricoh and Fuji Xerox today for the top slot in photocopiers, and with Minolta and Konica in office machines.[13] As noted above, Nikon and Canon are world leaders in steppers, equipment used for manufacturing semiconductors. In 1997, Nikon held 50 percent of the world market. Rather than moving into office equipment, Olympus pioneered the modern endoscope when it entered medical optics field in the 1970s. The firm's decisive response (to the changing prospects for camera/lens sales) meant that in 1997, Olympus held 70 percent of the world market for endoscopes. Asahi

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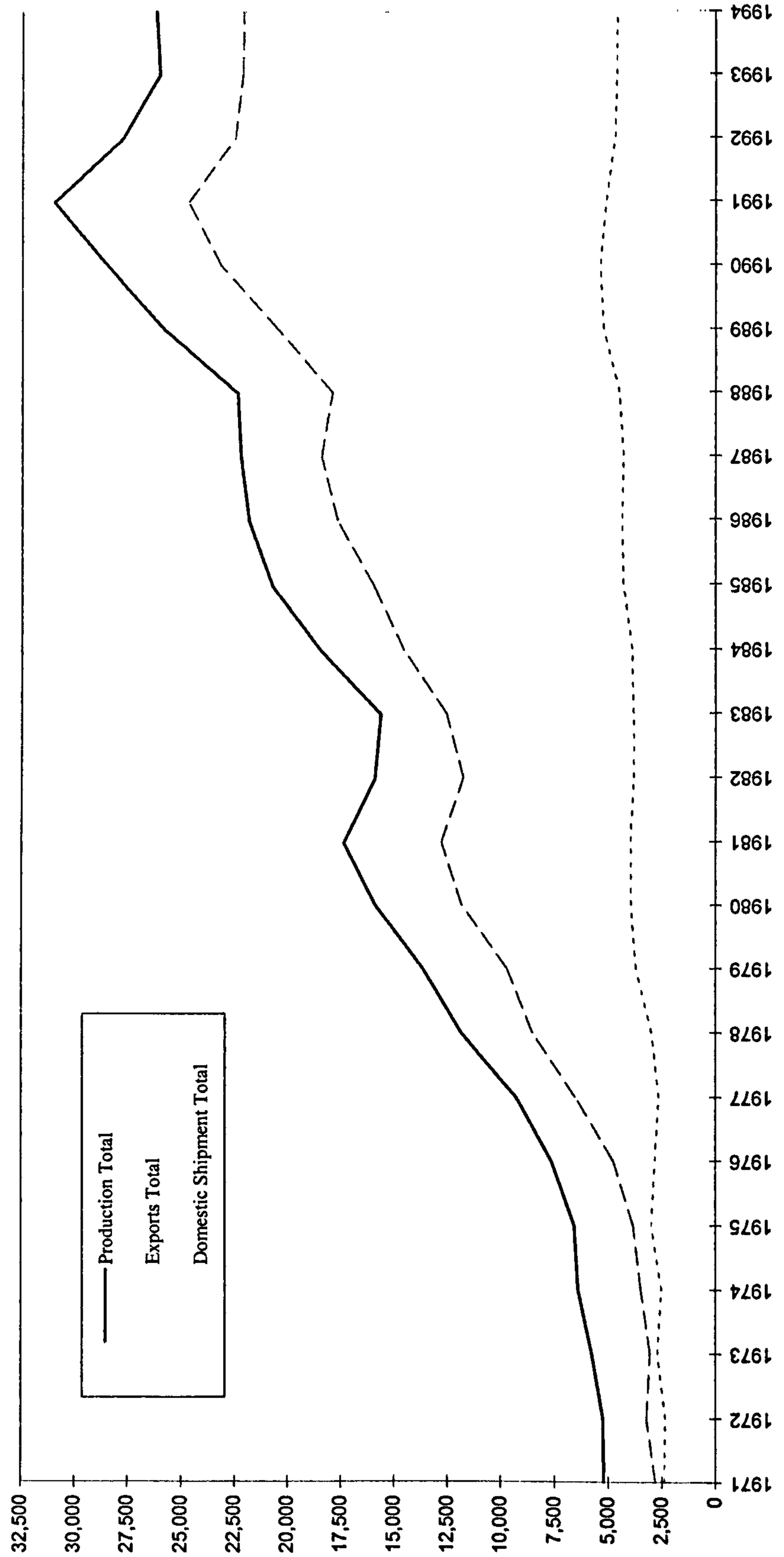
[13] Ricoh, formerly one of the 'top five' firms changed its strategy to rely on original equipment manufacturers (OEM) or other arrangements which allowed them to remain in the market without high levels of investment in new camera product development. The sources for the corporate data are company annual reports.

Optical followed in medical optics much later with gastrocameras and in the mid-1990s also manufactured endoscopes, but mainly for export markets.

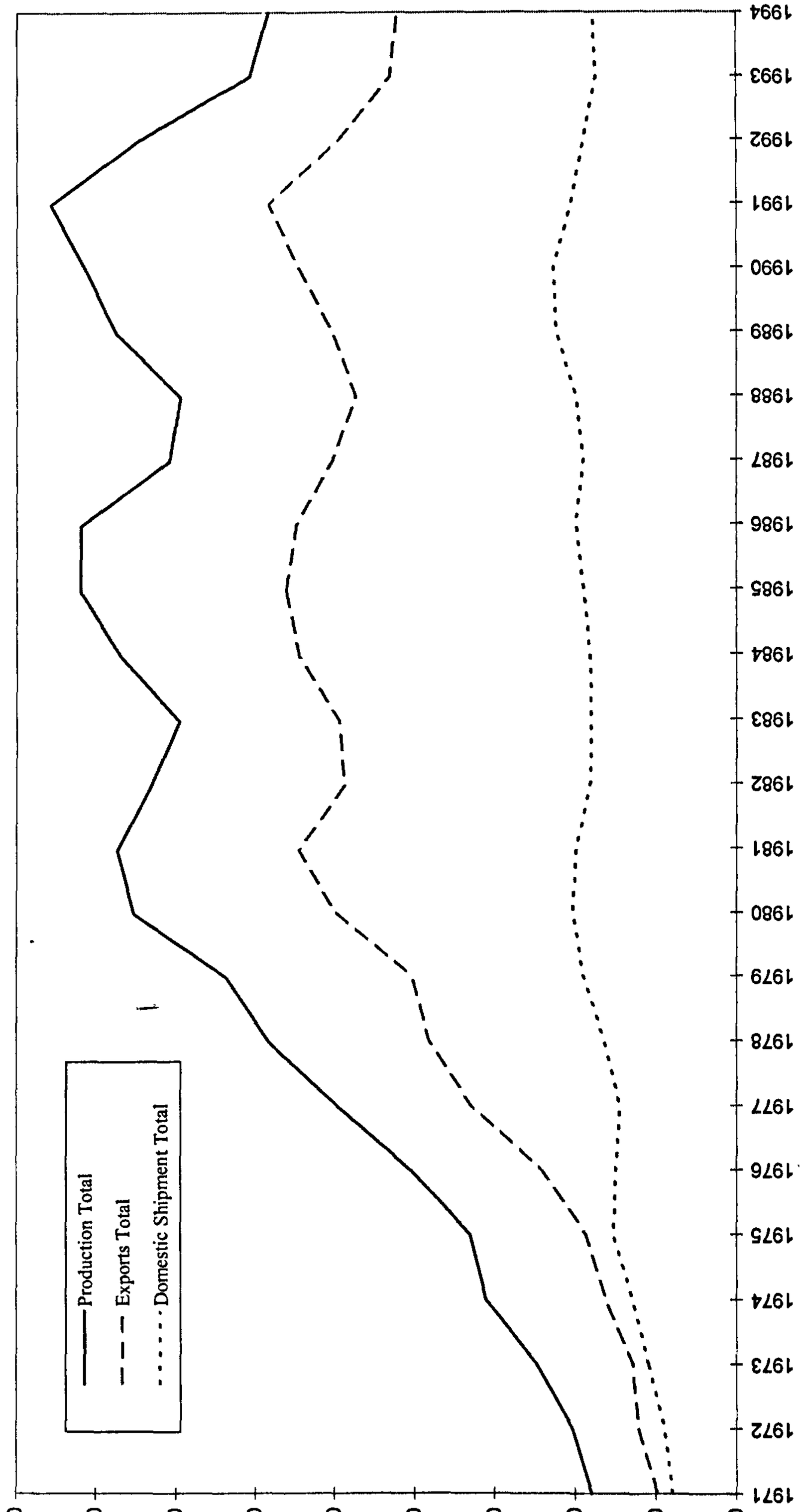
Despite predictions (e.g. Boon, 1970; Stone, 1969) of saturated markets, over capacity and increased competition from low-wage countries and firms in the late 1960s (see chapters two and four), Japanese camera/lens production continued to grow into the 1990s (see graphs 5.5 and 5.6). Until the early 1970s, the domestic market was the most important segment of Japanese firms' camera sales (see chapter four), but after 1975, exports expanded rapidly both in quantity and value. This was by and large a consequence of continuous technological advances and application of new materials which raised the barriers to entry for new competitors. Leading manufacturers also began to rely less on camera sales as a percent of total sales as they diversified into related products. The knowledge gained in the new fields often appeared as new camera electronics and advanced lenses, and advances in camera/lens technologies were fed into the newer product areas. Know-how seems to have moved relatively easily from one product area to another. Therefore, there was organizational learning (cf. Fruin, 1992).

By the early 1970s, a pattern had emerged in terms of company size and shares of cameras to total sales. Canon led the industry in terms of aggregate sales, while Asahi Optical took up the last position. In 1976, Canon's aggregate sales were over ¥100 billion ($340 million) with just over half coming from camera sales (see table 5.2). Canon diversified its product line early, dropping its dependence on camera sales to 24 percent by 1985. The firm most dependent on camera sales, Asahi Optical, also reduced its share from 93 to 56 percent over the same 1976 to 1985 period. Throughout the 1990s, Asahi Optical increased its dependence on cameras at above the 60 percent level, while Canon continued to reduce its dependence to only 8 percent by 1995. But the firm has not diversified out of cameras. In fact, it ranks as the largest supplier among all the camera/lens firms.

Graph 5.5 Japan's Production, Exports and Domestic Shipment of Still Cameras (Quantity), 1971-1994



Figures include cameras produced by overseas subsidiaries of JCIA member companies.
Sources: JCIA (1990) *JCIA Report 1990*, Tokyo, JCIA, pp. 30, 34, 36; JCIA (1995) *JCIA Report 1995*, pp. 30, 34, 36.



Graph 5.6 Japan's Production, Exports and Domestic Shipment of Still Cameras (Value), 1971-1994

Figures include cameras produced by overseas subsidiaries of JCIA member companies.
Sources: JCIA (1990) *JCIA Report 1990*, Tokyo, JCIA, pp. 30, 34, 36; JCIA (1995) *JCIA Report 1995*, pp. 30, 34, 36.

Table 5.2 Capital Stock, Sales & Employment Figures for the Top Seven Camera/Lens Manufacturers 1976[a] and Sales Figures for the Top Five, 1985 and 1995 (million yen, percent)

	1976					
	Capital Stock	*Number of Employees*[b]	*Aggregate Sales B*	*Camera*[c] *Sales A*	*Camera Share A/B*	*Industry Share A/C*
Canon	8,328	4,510	101,974	51,922	51	18
Nikon	5,729	5,423	63,115	43,468	69	15
Minolta	3,936	5,003	50,129	37,074	74	13
Olympus	3,197	3,127	53,568	29,210	55	10
Asahi Optical	2,700	2,724	26,906	25,155	93	9
Yashica	1,215	1,069	19,906	19,906	100	7
Chinon	1,000	1,317	27,143	21,201	78	7
Totals[d]	26,105	23,173	342,741	283,350		80

	1985			*1995*		
	Aggregate Sales B	*Camera*[c] *Sales A*	*Camera Share A/B*	*Aggregate Sales B*	*Camera*[c] *Sales A*	*Camera Share A/B*
Canon	575,369	135,492	24	2,165,626	177,537	8
Nikon	173,346	85,321	49	288,485	115,372	40
Minolta	198,627	115,831	58	333,656	96,606	29
Olympus	128,566	40,134	31	252,097	62,825	25
Asahi Optical	57,635	32,544	56	68,600	40,500	59
Totals	1,133,543	409,322		3,108,464	492,840	

Notes:
[a] Figures based on the calendar year for Canon.
[b] Establishments of 50 or more employees.
[c] 'Camera' includes still cameras, cine cameras and projectors, interchangable lenses, etc.
[d] The total for 'Camera Sales' is for the whole industry and is taken as C.

Sources: MITI (1978) *Sangyo Kikai Soran*, Industrial Machinery Section, Information Machinery Industry Division, "Shashinki," p. 416; JCIA, Nihon Kamera Kogyo-shi, Tokyo JCIA, 1987, p.147; Asahi Optical Co., Ltd., Jigyo Hokokusho FY 1995; Canon, Inc., Annual Report 1996; Minolta Co., Ltd., Annual Report FY 1997; Nikon Corp., Annual Report FY-1997; Olympus, Annual Report 1997.

For Nikon, Olympus and Minolta, the next largest firms in terms of aggregate sales (at $215 million, $180 million and $170 million respectively in 1976), cameras took between 55 and 75 percent share of their total sales. Asahi Optical and Yashica, both smaller firms (aggregate sales of $92 million and $68 million respectively), relied nearly 100 percent on camera sales. (Yashica is now owned by Kyocera.) By 1995, Olympus and Minolta had reduced their dependence on camera sales to 25 and 29 percent respectively. Nikon was slightly more dependent on cameras; they took 40 percent of aggregate sales.

All of the photography firms are dependent on exports for at least 30 percent of their camera/lens production. In 1997, the two firms with the lowest export ratios were Kyocera and Fuji Photo Film with 32 and 34 percent respectively. The two highest were Canon and Minolta with 79 and 76 percent. Konica, Nikon, Asahi and Olympus were at least 50 to 65 percent dependent on exports. By product in 1992, Nikon exported 30 percent of its steppers, 40 percent of its measuring equipment and 18 percent of its optical goods (Nikon, 1993, statistics supplement, p. 101). Although the industry picture in graphs 5.5 and 5.6 give the impression that the whole industry is quite dependent on exports, in fact, there is considerable variation among the firms. There is also a wide spectrum of more and less globalization and firm-firm rivalry. The Minolta Alpha 7000-Canon EOS autofocus SLR war is one example of intense firm-firm rivalry in cameras/lenses in the late 1980s (see chapter one).

The manufacture of photographic film is very different from that of cameras/lenses. The sensitivity of black and white and color film is determined by the "size of silver halide crystals suspended in the gelatin emulsion" (Rosenblum, 1984, p. 605). Because color film is more complex than black and white film, and dye-couplers are used with the silver crystals. The larger the silver crystals the faster the film; larger crystals are more light sensitive and allow faster shutter speeds. But faster film is grainier, producing "less tonally-defined images," especially if enlarged (Rosenblum, 1984, p. 606). Silver prices are a factor in the price of photographic film, and with faster film,

more silver is consumed. Photography is, according to the US Bureau of Mines, the largest user of silver. Their estimates indicate that the percent of silver used in photographic film rose from 25 percent to 46 percent between 1973 and 1988 (Martin, 1989, p. 52). Efforts have been made to recycle or lower the amount of silver used in photographic film; digital photography is also one step in that direction.

The market for 35 mm film worldwide is huge. In 1988, 85 percent of all film purchased in Japan was 35 mm, in the US the figure was 70 percent and in Europe, 65 percent (Martin, 1989, p. 103). Worldwide, exposures on color film that year were estimated at 39 billion (p. 9). Demands for faster film came from consumers, because cameras were moving in the direction of compact, 35 mm LS shutter cameras which had relatively small lenses, often with zoom functions. Smaller lenses allow less light to hit the film, i.e. they are not 'bright' lenses. Longer lenses with smaller lens apertures, i.e. telephoto and zoom lenses, mean that less light will reach the film. Increased rivalry between Fuji, Konica and Kodak in the early 1980s also led to a series of technological innovations in 35 mm photographic film (JCII, 1984, 468). For these reasons, photographic film manufacturers have pushed film speeds higher and higher especially since the late 1970s (JCIA, 1987, p. 180).

Firm-firm rivalry in 35 mm film really started in 1982, when Kodak introduced its HR Disc 200 (for the new disc cameras) (Dewey Ballantine, 1995a, p. 97). This set off a race between Kodak and Fuji to see which firm could bring out the best 200 ISO film. Fuji introduced a new, faster speed film, HR400 in 1982, notably the same year that Kodak brought out a slower (200 ISO) film (JCIA, 1987, p. 180). It took nearly a year for Kodak to develop its own 400 ISO film, the VR400. According to Dewey Ballantine (1995a), the US market is more receptive to 200 ISO film while the Japanese market seems to prefer 400 ISO. Increased 400 ISO film sales in Japan have cut into the market for the slower 100 ISO film, that is, people did not buy both 400 *and* 100 ISO film. They chose one or the other. (In general, faster film costs more.) The film

war between Kodak and Fuji and the battle for market shares in Japan as witnessed by the WTO case indicate just how global the photographic film business has become.

Toward global production

Japanese foreign direct investment (FDI) to East Asia has been on the rise since 1985. The Plaza Accord in 1985 adjusted the US dollar (widely believed to have been over-valued) vis-à-vis the other major currencies which had the effect of causing a drastic appreciation of the Japanese yen. (Another appreciation of the yen came in 1993.) In fact, between 1985 and 1990, Japanese manufacturing FDI took almost one third, the largest share, of total Japanese investment to East Asia (Machado, 1996, p. 47). In actual dollar amounts, manufacturing investments grew from $24.4 billion to $104 billion between 1985 and 1992. As a percentage of all firms investing in manufacturing facilities, Japanese firms represented 36 percent in 1991. Although Japanese firms were successful at home, by the mid-1980s, bi-lateral trade friction with the US and Japan's other trading partners and the yen appreciation had forced them to re-think their manufacturing strategies.

According to Shigeki Tejima (1996, p. 372) of the EXIM Bank, "Japanese FDI, at first, was oriented toward Korea, Taiwan, Hong Kong and Singapore, and later spread to Malaysia, Thailand, Indonesia, the Philippines and China." In 1996, he continued (p. 372), Japanese firms were "...keenly considering new possibilities of investment in Vietnam, India and all other Asia Pacific countries." In the photography industry this pattern held true. Firms moved conventional goods production to the first-tier newly-industrialized countries (NICs) in East Asia at first, and kept higher value-added goods in production facilities in Japan (see table 5.3).[14] Some aggressive firms realized that new

[14] This information is based on interviews with business leaders in the photography industry, Spring 1995. By second tier NICs, I am referring to Indonesia, Malaysia, the Philippines and Thailand in the first instance and in more recent years to Vietnam and China.

Table 5.3 Japanese Camera/Lens Manufacturing Facilities in East Asia, by Country

Country	*Company*	*Est. Year*	*Products*
Taiwan	Ricoh	1966	LS cameras
	Canon	1970	SLR, LS cameras, IL
	Asahi Optical	1975	photographic lenses (incl. IL)
	Konica	1989	LS cameras
	Olympus	1989	n.d.
Hong Kong	Kyocera	1967	SLR, LS cameras
	Asahi Optical	1973	SLR, LS cameras
	Olympus	1988	LS cameras
China	Olympus	1990	LS cameras
	Canon	1990	LS cameras
	Minolta	1994	LS, SLR cameras
	Olympus	1994	LS cameras
	Ricoh	n.d.	LS cameras
	Kyocera	n.d.	cameras
	Fuji Photo Film	n.d.	cameras (incl. APS)
Malaysia	Minolta	1973	SLR, LS cameras
	Minolta	1988	camera parts (incl. shutter unit, body)
	Canon	1989	LS cameras
	Copal	1991	shutters
Thailand	Nikon	1990	IL, SLR cameras
	Konica	1995	one-time-use cameras
Indonesia	Fuji Photo Film	n.d.	LS, instant cameras
	Nitto Kogaku	n.d.	LS cameras
Philippines	Asahi Optical	1990	LS cameras
	Asahi Optical	1992	photographic lenses

Notes: n.d. = no data; LS = lens shutter; SLR = single-lens reflex; IL = interchangeable lenses
APS = advanced photo system (24 mm)

Sources: MITI, "General Trend of the Japanese Camera Industry," mimeo; JCIA, *Nihon Kamera Kogyo-shi*, Tokyo, JCIA, 1987, p. 354; Toyo Keizai, *Nihon Kaisha-shi Soran*, part 2, Toyo Keizai Shimposha, 1995; annual reports; MITI (1981) *Sangyo Kikai Soran*, Tokyo, Industrial Machinery Section, Information Machinery Industries Div., ch.15 "Shashinki," p. 233 based on Toyo Keizai data.

export markets could absorb excess production and by seeking methods to cut production costs further, they could sell to an ever larger mass market. Off-shore production, for example in Taiwan, also served to insulate them against future incidences of 'excess competition' and helped firms avoid trade barriers. Early investments came in East Asia for off-shore assembly and sales and in Europe for distribution networks to build market share. However, the real push for off-shore production did not come until after 1985.

In cameras, as in other consumer goods industries, both prices and productivity have shaped Japanese FDI patterns since 1985. The result has been the rise of 'reverse imports' to Japan of photographic goods (i.e. cameras and lenses) made by Japanese firms in East Asia. Price pressures forced most camera/lens makers to move not only assembly but also parts of their production out of Japan over the 1985 to 1995 period. Heightened firm-firm rivalry, expansion of markets for Japanese consumer goods in Asia and continued saturation of matured markets in the developed countries in the early 1990s contributed to this trend.

The most damaging to the photography firms' profitability over the 1985 to 1995 decade has been the effect of unpredictable foreign exchange rates, particularly the yen-dollar rate, which has forced some drastic measures, unthinkable just a few years ago. These include purchasing components from the company which offers the lowest price (regardless of *keiretsu* relationships), sacking employees (of the parent firms not the subcontractors) in Japan, and moving low as well as high technology manufacturing out of Japan. In addition to exchange rate fluctuations, the pressure to keep the price of photographic goods low (especially of compact cameras and lenses but also on other goods), have made these changes necessary for corporate survival.

Since the mid-1990s, however, the lack of domestic demand in Japan for higher value-added goods coupled with the further appreciation of the yen in 1993 made 'hollowing out' a real threat: production of some higher value-

added goods moved to East Asia.[15] The situation was so bad in the late 1980s, that when the JCIA was approached by MITI to write a vision statement for the 1990s for cameras/lenses (similar to the one they had prepared in the 1980s) they refused (cf. JCIA, 1979). The firms did not know where the industry was going, because production was moving out of Japan (see table 5.3).[16]In recent years, plants have been built in Vietnam, and through their established sales and manufacturing agents in Hong Kong, many firms moved into China.

Has an East Asian production network emerged in the photography industry so firms can take advantage of low-cost, low-tech production and then export the goods to the open US market (cf. Hatch and Yamamura, 1996)? Tejima (1996, p. 374) notes that firms "realized that the most effective economic organization is not the conventional domestic network of Japanese assemblers and parts suppliers (that is, a closed system within Japanese companies in Japan) but international production networks." There is considerable agreement (e.g. Tejima, 1996; Bernard and Ravenhill, 1995; and Hatch and Yamamura, 1996) that one of the forces that shifted Japanese manufacturing to Asia was bi-lateral US-Japan trade friction over Japan's mounting export volumes to the US especially after 1985. But Tejima, unlike the others, appears to base his explanation on Japanese firm strategy rather than on government guidance.

Production of cameras in Japan had all but disappeared by 1995, and imports of photographic goods had grown.[17] In terms of actual trade between Japan and other countries, there has been a marked increase in imports to Japan of both simple and complex cameras and lenses. The value of the imports of 35 mm roll film cameras (i.e. simpler types of cameras, mainly compact LS cameras) nearly tripled while the value of SLRs (i.e. more complex

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[15] Hollowing out is the Japanese term for de-industrialization, or the loss of basic manufacturing in an economy.
[16] Information based on interviews with JCIA officials, Spring 1996.
[17] Only Canon and Nitto Kogaku had camera manufacturing facilities in Japan in 1996.

and higher value-added cameras), increased by a factor of 16 from 570 million yen to 8.1 billion yen over the period 1990 to 1995. In terms of increased imports to Japan from East Asian countries, 35 mm roll film cameras showed the greatest change (see table 5.4 and appendix 5b). In optical products, a similar trend appeared. The value of imported photographic objectives (i.e. lenses) doubled between 1990 and 1995. As with camera production, considerably more lenses were being produced in Asia in 1995 than in 1990. Lenses are more complex technologically than most types of cameras, and many firms had their lens production in Japan in 1996.[18]

In photographic film, the countries of origin of imports broadened quite a bit between 1990 and 1995. The major of shares Japan's imports came only from industrialized countries, with low or insignificant levels of imports coming from Asia. This is because firms such as Fuji have manufacturing plants for film and paper in the US, not in East Asia (Katz, 1988, p. 9). Like the camera/lens firms, the film makers rely on the FDI in industrialized countries to avoid charges of anti-dumping (e.g. the case brought against Fuji in the US in 1993) and to tap into local creativity (e.g. Canon's 'kyosei' policy of respecting the country of origin in technology development) (cf. Canon, 1994).

In the photography industry, assembly plants and manufacturing plants have been established in East Asia to serve the local Southeast Asian, the Japanese *and* the US markets. Shrinking corporate profits in Japan in the early 1990s, forced many firms to pursue this type of corporate strategy. That is, firms decided to utilize the second-tier NICs as a manufacturing base for certain products, and to raise the technological level of these plants over time when and if conditions for manufacturing in Japan worsen. Hatch and Yamamura (1996) claim that Japanese firms exploited low-cost labor in East Asia by setting up production facilities there. Furthermore, they say that Japanese firms are now exporting 'Japanese' goods made in East Asia to the US to avoid additional complaints from the US of the large bi-lateral trade

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[18] Information based on interviews, Spring 1996.

Table 5.4 Imports to Japan in 1995 and 1990 of:

(percent of total; million yen)	Lenses for Cameras Code number: 9002.11-010		SLR Cameras, max. 35mm, not 16mm cartridges Code number: 9006.51-090		35mm Roll Film Cameras Code number: 9006.53-000	
Country of origin	*1995*	*1990*	*1995*	*1990*	*1995*	*1990*
(West) Germany	30.0	35.7	3.7	38.0	2.9	4.2
Thailand	14.7	--	1.1	--	4.7	--
Malaysia	18.9	15.2	55.6	3.5	11.4	15.6
Taiwan	18.1	12.2	25.7	18.1	16.1	35.8
Sweden	8.5	26.6	--	--	--	--
USA	3.7	--	0.8	3.9	8.9	9.5
Hong Kong	2.0	--	--	30.1	6.4	12.2
China	--	--	11.4	--	12.9	--
Singapore	--	--	--	1.5	--	--
Indonesia	--	--	--	--	13.6	19.6
Philippines	--	--	--	--	11.9	--
South Korea	--	--	--	--	11.0	2.6
Total (million yen)	5,201	2,651	8,056	569	33,059	12,696

Source: JTA (1995) *Japan Exports and Imports, Commodity by Country, Tokyo, Dec.; JTA (1990) Japan Exports and Imports, Tokyo, Dec.*

imbalance in Japan's favor. They also stress the importance of institutions and the specificities of each nation, but they dismiss the ability of multinationals to make strategic decisions independent of the desires of Japanese government bureaucrats.

The evidence from the photography industry does not fully support their claims. Hatch and Yamamura leave no room for the possibility that firms might have led and that the government might have taken credit after the fact. It is also possible that the business lobby forced concessions from the Japanese government to allow these production networks to grow (cf. Encarnation and Mason, 1990). What has happened is that Japan is reverse importing cameras/lenses because production in Japan has become too expensive or otherwise unprofitable. In Japan's photography industry, reverse imports are concentrated in cameras and lenses, but *not* in photographic film.

Conclusion

Government policy became gradually less important to the photographic firms after 1974, and the firms came to depend more on their own strategies directed at global markets. Firms did not all behave in the same way; some relied more on government guidance than others. Other factors that had changed from the pre-1974 period were the international monetary regime, the 1970s oil crises and the economic slow down in the industrialized countries as the postwar boom ended. During the 1980s, US and EU tolerance of Japan's persistent export surpluses grew thin and once the Soviet threat was gone, Japan's role in US security policy in East Asia decreased while the perceived threat of the Japanese economy to US competitiveness increased. Consumer preferences were also changing and markets for cameras/lenses became saturated. Therefore, firm-firm rivalry increased among the camera/lens and film manufacturers and as technological levels reached new highs, firm-firm battles were fought over market shares.

There was no apparent technological threat from the Japanese makers to US domination in photographic film until the 1980s. During the 1960s and 1970s, Japan was strongly urged to abandon its protective measures by the OECD, GATT, etc., but as noted in chapter one, the tendency was to change course very slowly, and not before the photography industry was ready. Market and trade opening in photographic film is a good example of what Shigeto Tsuru (1996) called 'not too soon and not too late' liberalization (see chapter two). In this case, it means that the camera/lens and film makers were able to organize distribution in the domestic market before trade and capital barriers (e.g. import quotas and tariffs and investment restrictions) were completely removed in the late 1970s.

Kodak was seen as a giant in the world photography industry, so it was clear to the Japanese photographic film makers that a reliable supply of goods to the important domestic market had to be secured. By making the Japanese market a stable source of income (through the distribution system), firms sought to protect themselves against take-overs, mergers and/or bankruptcy. The camera/lens firms set up their own sales companies in the 1960s to secure better distribution throughout Japan. The result was that diffusion of cameras among the Japanese population rose from 53 percent in 1966 to 82 percent in 1978, reaching roughly 87 percent in 1994 (see appendix 5c and JCIA, 1995, p. 24). Fuji Photo Film was more aggressive than Konica in setting up its distribution *keiretsu* with four of the main photographic goods *tokuyakuten*. This was perhaps due to Konica's weaker position in film technology and to its posture as being more independent of the government than Fuji.

During the 1974 to 1995 period, Fuji Photo Film challenged Kodak first in volume manufacturing and second in photographic film technology. Fuji's relative strength in the US market vis-à-vis Kodak also grew. In 1998, Fuji held 19 percent of the US market, up from 10 percent in 1994. Kodak, on the other hand held 60 percent of the market, down from 80 percent only four years earlier (Katz, 1998, p. 9). Kodak's efforts to change Japan's competition policy

in the mid-1990s through its Section 301 case and then the US government's WTO case were not successful (cf. Dewey Ballantine, 1995 a and 1995b; and Katz, 1998). But APS and the increase of foreign ownership (close to 40 percent) in many firms and the unstable banking/*keiretsu* situation may erode some of the rigidities that have developed in Japan's distribution system and investment structure. This may all work to Kodak's advantage in the long term.

There was both cooperation and rivalry in the government-industry relationship regarding photographic film in the post 1973 period, some of which may be attributed to the firm's relationship to its horizontal *keiretsu* group.[19] Michael Gerlach (1992, p. 191) notes that membership in a horizontal *keiretsu* group implies "a variety of business interests, some of them not directly related to corporate profitability." As shown above, Fuji Photo Film (quasi-affiliated with the Mitsui group) cooperated more closely with the government than did Konica (affiliated with both the Mitsubishi and Sanwa groups) during the 1974 to 1995 period. Konica's independence from a specific group, may have allowed it more leverage to pursue its own path and business strategy, while the opposite may have been the case for Fuji.

Similarly, among the leading camera/lens firms, i.e. Canon, Minolta and Nikon, some tended to cooperate with the Japanese government during the post-1973 period while others did not. Canon and Nikon developed the know-how to make steppers for semiconductor manufacturing within the VLSI research project from 1976 to 1980. Jay Stowsky (1989, pp. 249-251) makes the point that for the advancement of semiconductor technologies in Japan, *keiretsu* structures "provided an ideal institutional context for close collaboration between semiconductor device makers and their fledgling equipment suppliers."

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[19] Fruin is more circumspect saying (1992, p. 30), "Group membership ... is not determinative, not especially predictive, and not at all indicative of behavior. Historical and contemporary reasons may be adduced for this."

Canon is a core member of the Fuyo group, and tends to cooperate with other firms or with the Japanese government when it suits Canon's overall strategy. Nikon is a core member of the Mitsubishi group, and seems more likely to cooperate with other firms and with the government perhaps at the expense of its own firm strategy and profitability. In contrast, Minolta is loosely affiliated with Sanwa and Sumitomo, and leans toward pursuing an independent business strategy. This may explain why Minolta was not a member of the VLSI project.

According to Gerlach (1992), some firm behavior can be explained by the fact that the newer *keiretsu*, i.e. Dai-Ichi Kangyo, Fuyo and Sanwa, are much larger and more loosely organized than the *keiretsu* based on the oldest *zaibatsu* groupings, i.e. Mitsubishi, Mitsui and Sumitomo. Furthermore, core members of these groups participate in the group's presidents' council (*shacho-kai*) which meets on a regular basis to discuss group business. In the case of Fuji Photo Film which is quasi-related to the Mitsui group, the distinction between core members and quasi-related firms serves to emphasize the difference between old-guard group members (24 firms in Mitsui) and the newer, extended group firms (44 firms in Mitsui) (Gerlach, 1992, pp. 172-173). In the Mitsui group, the two tiers of firms meet in separate councils (the Nimoku-kai for the core members and the Getsuyo-kai for the quasi-affiliates) to discuss business. The structure of the horizontal *keiretsu* presidents' councils and the information transfer function that they perform is reminiscent of the industry associations (i.e. the JCIA and the PSMA) and the regular meetings held by the presidents of the leading firms to discuss conditions in the industry (see chapter three) (cf. Dore, 1986; Fruin, 1992).

Fuji Photo Film has its own network of firms within its *keiretsu*, it is also part of the Mitsui group, albeit not a core member. Canon likewise has its own vertical *keiretsu* and is part of the Fuyo group. Nikon is a core member of the Mitsubishi group, Kyocera a member of the Sanwa group and Asahi Optical part of the Dai-Ichi Kangyo group. Konica, Minolta and Olympus are more

independent, or their shares are held in roughly equal parts by the financial institutions of two or more groups.

The vertical and horizontal keiretsu serve functions in the Japanese market which may be more actively utilized by some firms than others. The firm-industry association-government link in the photography industry over the 1974 to 1995 period indicates that cooperation (organized through the industry associations and with the distributors) was used for price maintenance, that is maintaining some price stability and uniformity throughout Japan (cf. Dore, 1986). While this behavior is not supported by neoclassical economics, it served to protect the firms by allowing them to reinvest their profits (which were higher at home than overseas) in R&D, to expand their production lines and recycle advances in technology back to original lines (especially true for cameras and lenses, but also noted by Dewey Ballantine (1995a) in film). As a result, they raised the technological levels of their products (i.e. cameras/lenses and film) *and* raised the level of firm-firm competition on a global scale. Not all firms were as active in expanding their product lines and directing their profits into R&D that could keep them at the forefront of the industry technologically. And perhaps not all firms were able to do it successfully.

The positive side of cooperation and rivalry in the photography industry during the post-1974 period is that many firms participate in an oligopolistic structure (five in cameras/lenses and two in film). This is far more than participate in the rest of the world. In the US, for example, only two firms, Kodak and Polaroid, are photographic goods makers and Polaroid is struggling to stay in the market altogether.[20] The negative side of Japan's oligopolistic structure in the photography industry is that prices are kept very high, but consumers also enjoy a wide selection of goods. Firm-firm rivalry in the photography industry was mainly in product innovation (coupled with

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[20] Information based on interviews, Fall 1996.

effective sales and marketing) as firms attempted to capture ever larger global market shares.

The domestic cost of production gradually forced many firms to move manufacturing facilities out of Japan, mainly to East Asia where labor costs are lower and local markets could be expanded. Since 1985, Japanese photographic firms moved lower-technology manufacturing and then higher and higher technology manufacturing to their East Asian subsidiaries. How this will affect *keiretsu* structures is still unclear, but as the economic situation in Japan continues to flounder, many firms have shifted away from traditional main bank (horizontal *keiretsu*) shareholding to increased levels of foreign shareholders. Canon and Fuji are now more than 40 percent owned by non-Japanese shareholders, and this apparently is becoming the norm among large, successful firms.[21] How the photographic firms' relationships with their suppliers and distributors, what has been identified as X-efficiency in Japanese firms (cf. Dore, 1986), have been affected by changing economic conditions worldwide is also not yet clear. The evidence from the photography industry during post-1974 period indicates that the 1990s are bringing about changes to the Japanese economy which are led not by government economic policy but by firms that are dependent on global markets.

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[21] This trend was confirmed by Masamoto Yashiro, Non-executive Chairman, Citicorp Japan at an Asia-Pacific Technology Seminar in London, 6 July 1998.

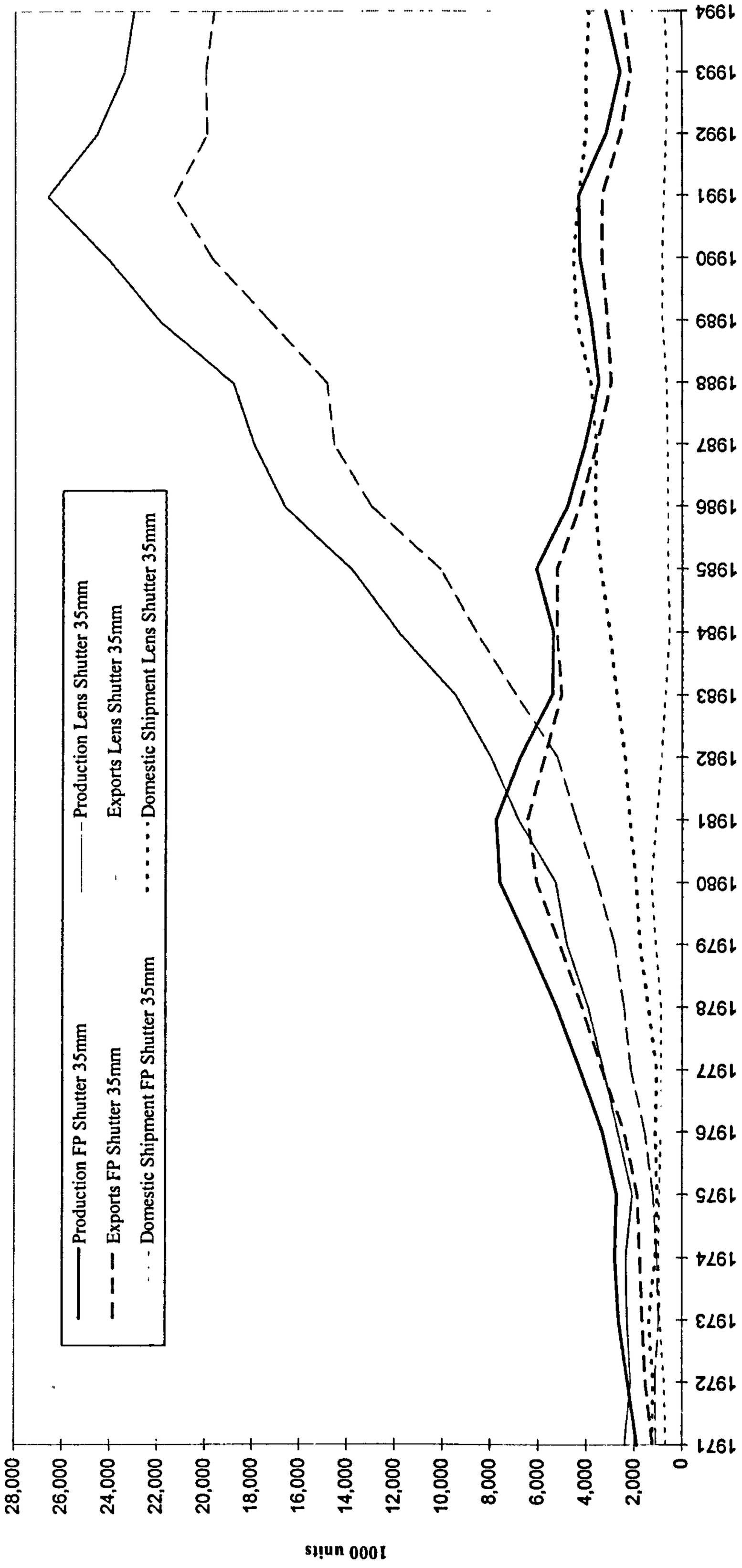
Appendix 5a Sales of Sensitized Materials by Japanese Manufacturers, Fiscal Years 1955-1959 and Sales of Sensitized Materials by the Four Main Producers, Fiscal Year 1959 (thousand sq.m., thousand dozen, thousand yen)

	Film (m^2)		*Sensitized Paper (m^2)*		*Dry Plates (kd)*		*Total*
	Quantity	*Value*	*Quantity*	*Value*	*Quantity*	*Value*	*Value*
1955	7,706	12,439	12,742	4,397	484	298	17,134
1956	8,342	13,160	14,591	5,010	561	356	18,526
1967	8,016	13,063	14,737	4,740	553	350	18,154
1958	9,064	14,926	15,567	5,050	567	363	20,339
1959	9,780	16,946	17,655	5,754	708	432	23,132
Fuji Photo Film	7,046	12,597	5,021	1,765	104	61	14,423
Konica	2,369	4,319	2,927	1,022	281	171	5,513
Oriental	4	30	5,096	1,730	323	200	1,959
Mitsubishi	...	...	4,611	1,237	...	...	1,237
Total 1959	9,780	16,946	17,655	5,754	708	432	23,132

Note: Thousand dozen is abbreviated 'kd.'

Source: Adapted from M. Seki *et al* (1961) *Kamera Fuirumu* (Camera and Film), Tokyo, Yugenkaku, pp. 92, 93.

Appendix 5b Japan's Production, Exports and Domestic Shipment of 35 mm Cameras (Quantity), 1971-1994



Figures include cameras produced by overseas subsidiaries of JCIA member companies.
Sources: JCIA (1990) *JCIA Report 1990*, Tokyo, JCIA, pp. 30, 34, 36; JCIA (1995) *JCIA Report 1995*, pp. 30, 34, 36.

Appendix 5c Diffusion Rates of Major Durable Goods in Japan, 1966 and 1978

Item	*1966*	*1978*
Cameras	52.9	82.1
Washing Machines	n.d.	98.7
Color Televisions	0.3	97.8
Vacuum Cleaners	n.d.	97.8
Refrigerators	n.d.	97.5
Automobiles	12.1	51.8
Stereos	16.7	56.7
Tape Recorders	17.9	59.6
Pianos	4.2	15.1
Bicycles[a]	71.8	76.8
Golf Sets[b]	4.4	15.5

Notes: [a] 1967 figure
[b] 1969 figure
n.d. = no data

Source: T. Kano and Y. Tezuka (1979) *Kamera Shashin Gyokai*, Tokyo, Kyoikusha, p. 128.

6. Conclusion

Introduction

The story of Japan's government-industry relations vis-à-vis the photography industry should not be limited by traditional industrial policy analysis. Instead, it should be told from an international political economy perspective which includes, e.g., security, technological change, knowledge and information flows, the finance and production structures and how the relative importance of these factors changed over time. As discussed in chapter two, much of the literature on Japan's government-industry relationship is general and therefore contributes little to our understanding of how specific sectors evolved in Japan during the postwar period. In addition, some literature (e.g. Callon, 1995; Johnson, 1982; Komiya, 1988; Trezise, 1976; Tyson and Zysman, 1989) stresses one factor above all others (e.g. state/bureaucratic intervention or market forces) as the key to unlocking the mystery of Japan's economic 'miracle.' The state-centered approach credits government bureaucrats with the success of Japan's postwar economy (e.g. Johnson, 1982 and 1989; van Wolferen, 1990), and the market forces argument assumes that the state did nothing to aid the recovery and subsequent growth of the Japanese economy (e.g. Trezise, 1976), especially with regard to industries driven by domestic demand (e.g. Komiya, 1988).

The term 'industrial policy' was not commonly used in Japan until the early 1970s (Komiya, 1988 and 1990; Okuno-Fujiwara, 1991; Suzumura and Okuno, 1986) and it is certainly not unique to Japan.[1] Industrial policy cannot be discussed without taking economic and noneconomic factors into account

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[1] See chapter two for a more detailed discussion.

or without acknowledging that there is considerable variability among industries (Magaziner and Hout, 1980). Nonetheless, the debate over who or what controlled Japan's spectacular economic success in the post-WWII period continues.

The 'developmental state' or the 'revisionist' view of industrial policy is that a highly-educated bureaucratic elite (in the MoF and MITI) guided Japan's economic 'miracle' through effective planning and politics (e.g. Fallows, 1989; Johnson, 1982 and 1995; Prestowitz, 1988; and van Wolferen, 1990).[2] At the other extreme are liberal economists who, *if* they recognize industrial policy's existence, see it as a response to 'market failure,' yet there is little agreement on what are appropriate responses by governments to such situations (e.g. Eads and Yamamura, 1987; Komiya, 1988; and Trezise, 1976). The 'pluralists' (e.g. Aoki, *et al*, 1996; Calder, 1993; Okimoto, 1989; and Vestal, 1993) place themselves somewhere in between the contrasting liberal economic and revisionist viewpoints. Generally, they recognize that bureaucrats in Japan believe that the invisible hand of the market (i.e. industry) *at times* needs the visible hand of government (i.e. the bureaucracy) to keep things on the right track (cf. Okimoto, 1989). The pluralists take the industrial policy discourse one step closer to international political economy, because they go beyond the strong bureaucrat vs. market failure debate.

Studies based on sectors and firms which analyze the role of the firm in Japan – and grew in popularity during the 1990s (e.g. Abé, 1997; Aoki, 1990; Aoki and Dore, 1994; Callon, 1995; Dore, 1986; and Fruin, 1992) – are another step in that direction. Some studies focus on one or more industries, but they seldom analyze a large number of firms within the industries and most concentrate on the industries' relationships with specific bureaucracies. A few scholars, notably Mark Mason (1992) and Dennis Encarnation with Mark Mason (1990), have focused on multinational corporations (MNCs) vis-à-vis

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[2] The realist view in political theory (i.e. that state intervention and trade protection were crucial for latecomers to the process of industrialization) is very close to the revisionist position.

Japan's government-industry relationship.[3] MNCs (and other non-state actors) are important in the international political economy because they have changed the terms of global competition by taking an active role in national, regional and international policymaking (Stopford and Strange, 1991; Strange, 1996). Although a great deal of advancement has been made toward developing the international political economy perspective, it has proved difficult to move away from the traditional market-state framework (cf. Strange, 1996, p. 185, note 2), and the debate over Japan's industrial policy is no exception.

As described in chapter one, the words 'rivalry' and 'cooperation' are used to capture the relationship between the state and the market in the Japanese photography industry over the post-war period. Both rivalry and cooperation existed throughout, but one often took precedence over the other. The three main relationships identified in the photography industry are:

- bureaucrat-politician;
- government-industry; and
- firm-firm.

The evidence presented throughout this thesis shows that government policy was at times beneficial and at times problematic for the firms in the Japanese photography industry. Kinji Moriyama is quoted in his biography (Yayama and Ito, 1988, p. 335) as saying that there was a "balance between competition and cooperation" (*kyoso to kyocho no baransu*) in the photography industry's relationship with the Japanese government. Instead of a balance, the photography industry demonstrates that the three relationships identified above were characterized more by cooperation during the recovery years up to the early 1970s, and more by rivalry after that point. (This is discussed in more detail below.) The word 'rivalry' was chosen over 'competition,' because even though 'competition' is adequate to describe the firm-firm and the

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[3] MNCs might be more appropriately called transnational corporations.

government-industry relationships, it pales when applied to bureaucrats and politicians, who are rivals rather than competitors.

The story of the Japanese photography industry shows *that industries are different* and *firms are different*. Moreover, it indicates that the relationship between governments and industries is affected by many factors some of which are beyond their control and which shift in importance over time. This is why more research on government-industry relations in specific industries and firms (in Japan and elsewhere) is needed to further our understanding of the power relations in international political economy.

Beyond industrial policy

The literature review in chapter two analyzed the industrial policy debate, and concluded that there is a need to develop the discourse beyond industrial policy (and international economic relations) toward international political economy. Most industrial policy analyses overlook important factors in the international political economy that affect the government-industry debate, e.g. a historical perspective, security arrangements, information flows, technological change and changes in structural power. An eclectic approach was chosen for this thesis, because first, many important aspects of power and authority are ignored in the industrial policy literature, and second, the international political economy literature is still underdeveloped. The aim was to provide (to the extent possible) a full picture of government-industry relations in the photography industry.

The evidence from this thesis shows that Japan's export-oriented consumer goods industries (e.g. the photography industry) exemplify the change that occurred in Japan's government-industry relations and the growth of Japan's MNCs in the global economy, especially in the last ten years. As discussed in chapter one, these industries have attracted very little scholarly attention (save the electronics industry), and the traditional preoccupation

with the so-called 'strategic' industries (e.g. steel, shipbuilding, petrochemicals, automobiles, semiconductors and computers) predominates the literature. Empirical data on most non-strategic Japanese industries is lacking, especially in English which has prompted leading scholars to call for in-depth case study analyses of other sectors (cf. Yonekura, 1996).

It is generally agreed that Japan's industrial policy heyday was prior to the early 1970s (cf. Callon, 1995; Vestal, 1993). Dynamic change over time means that industrial policies in, for example, 1960 *differed* from industrial policies in the 1980s (cf. Vestal, 1993, p. 2). This is because the consensus needed for effective industrial policymaking began to break down in the early 1970s, and the tools to carry it out became more limited as Japan's successful economy came into the international, and especially the American, spotlight. As Japan's geostrategic importance in American foreign policy waned, the US government grew more sensitive to the demands of the American business community and to narrow economic indicators, e.g. bilateral US-Japan trade balances.

The military-strategic motivations which shaped Japan's early economic recovery based on export promotion are vital to understanding the success of the photography industry and other early export-oriented industries (cf. Cohen, 1949; Itoh and Kiyono, 1988). The geostrategic concerns of US foreign policy were critical for facilitating Japan's economic recovery and growth from the Allied Occupation right up into the 1970s. Japan's strategic position and role as a strong American military, political and economic ally must be taken into account in any political-economic analysis of Japan's postwar period.

Import substitution has lost favor with economists, but it is exactly this policy (i.e. export promotion and import protection) which worked in Japan's early postwar years. Japan's over-riding need was to generate US dollars through exports to pay for imports and happily this occurred in a regional and international environment which favored import substitution. Without the flow of foreign exchange (in US dollars) into Japan to pay for the imports that

the economy needed for survival, Japan's economic recovery might never have taken hold. As described throughout this thesis, Japanese firms were encouraged to export goods that American consumers demanded and to recycle some of the dollar earnings into up-grading Japan's industrial structure. Over time, the value of Japanese exports rose and the increased levels of US dollar earnings hastened economic recovery (cf. Itoh and Kiyono, 1988, pp. 156-157). A central objective of US foreign policy in the late 1940s was getting Japan and Western Europe back on their economic feet.

The backbone recovery industries,[4] including cameras/lenses and film, benefited from export promotion and import protection and helped lay the foundation for the later development of higher value-added industries (cf. Abé, 1997; Hidaka, 1997). This history of import substitution helps explain how economic recovery came about and how Japan came to be dependent on the export-oriented sector to drive economic expansion (cf. Calder, 1993). Exports were successful because of what became a very favorable exchange rate for the yen which meant exports could be profitable even when sold at very low prices in overseas markets. The exchange rate remained favorable for exports until the early 1970s, when the Bretton Woods system began to break down. Little political pressure was directed toward the Japanese government to revalue the yen because until the early 1970s, Japanese economic recovery — as a central feature of US security policy in East Asia — took precedence over international trade.

Because Japanese exports were given priority over goods to be supplied to the domestic market, export-oriented firms were able to benefit most from export-oriented government policies. As the photography industry shows, none of the non-exporting firms survived to the present day the intense competition in the industry itself. This is because exporters benefited from institutional support (provided by both bureaucrats and politicians) in the

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[4] These were the industries promoted in the late 1940s and upon which recovery was based. See chapter one for a more detailed discussion.

form of the inspection institute and the industry associations. The former worked to raise the quality and technological standards of all exports while the latter encouraged firms to cooperate through e.g. technological development and information sharing. In addition to receiving help in improving the quality and international competitiveness of their products, exporters were also given help in developing overseas marketing channels. All of these activities improved knowledge flows and camaraderie among the exporters and insured a degree of social/business control.

Before the 1970s, much of Japan's industrial policy was focused on the industrial and financial aspects of promoting exports and protecting the domestic market from imports. Capital flows were bureaucratically controlled and much of the financing to make recovery possible came from government (mostly long-term lending) and commercial (mainly short-term lending) banks. Foreign direct investment was difficult to arrange at best (cf. Mason, 1992) and most imports were regulated via quotas. In general, the Japanese government took a 'developmental state' approach, and kept close watch on how the economy was recovering.

Supportive policies to aid one industry (e.g. machine tools in general, Komiya, 1988) created spillovers into other industries which were dependent on, for example, high quality machine tools. Thus, a supportive atmosphere for economic growth was created not only for the recipients of specific industrial policy measures, but also for all industries affected by the directly-supported industry. As recovery turned to prosperity, *keiretsu* structures (horizontal and vertical) worked to improve efficiency and thereby reduce transaction costs. The horizontal *keiretsu* (i.e. the reformed and reorganized pre-war *zaibatsu*, or concerns) supported group firms through bank lending in an unstable economic environment (especially during the 1950s and 1960s), while the vertical *keiretsu* developed to improve business efficiency which, once the exchange rate advantage was gone, helped exporting firms price their goods competitively.

After 1973, the three main relationships (bureaucrat-politician, government-industry, and firm-firm) in Japan were dramatically transformed by internal and external pressures. In particular, authority over the market changed in Japan and globally, and consumer goods industries which are very price sensitive were particularly vulnerable to this change. Cooperation was gradually replaced by rivalry in the three main relationships and the story of the photography industry indicates the extent of the shift in power relations.

Export promotion of Japanese cameras and lenses was such as success in the US and Europe that all international (mainly West German) competition had been eliminated or was on the defensive by the early 1970s. This had major consequences for firm-firm relations, especially once all the top camera/lens firms were Japanese. Moriyama's role shifted from promoting and marketing 'Japanese' cameras and lenses to developing international cooperation among the remaining photography firms, i.e. keeping international photographic relations smooth. The two firms that made film as well as cameras/lenses (i.e. Fuji and Konica) were able to benefit from the protected Japanese domestic market during the early 1970s.

But this did not last long as international pressure grew for Japan to abandon the developmental strategies of export promotion and import protection. Pressure from the US in particular increased as the importance of Japan's military-strategic role in US foreign policy decreased. In response to external pressures and to popular pressures at home to break the corporatist arrangement between firms and the government, MITI was restructured (cf. Johnson, 1982). One consequence for the photography industry was a reduced role for the industry associations and the inspection institute. But this trend had already begun in the 1960s after MITI took control of the camera information centers that had been set up due to political (rather than bureaucratic) initiative.

Competitive threats within the global photography industry came mainly from Japanese companies, not from non-Japanese companies as in the

past. Thus, after the early 1970s, competition increased among the global market leaders (i.e. the Japanese firms) for world market shares through technological and product innovation. Some firms (e.g. Canon and Minolta) turned toward diversification and large-scale production strategies, while other firms (e.g. Nikon and Asahi Optical/Pentax) pursued niche strategies. MITI's later industrial policies facilitated joint government-industry research projects including the development of optics technologies (rather than cameras, lenses or film) for steppers which are used in semiconductor fabrication. For two of the leading photography firms, Canon and Nikon – rather than for all of the exporters as in the past – steppers became a lucrative sideline.

The increased mobility of international finance meant that firms were freer to move capital and/or operations out of Japan. This new mobility combined with exchange rate pressures on the yen from the mid-1980s, encouraged firms to invest in manufacturing facilities (rather than marketing offices) in East and Southeast Asia. Fluctuating exchange rates encouraged firms to seek least-cost supply alternatives instead of remaining locked into traditional vertical *keiretsu* relationships.

Partly as a result of international (mainly US) pressure, the photography industry's inspection institute (the JCII) was 'deregulated' in 1989, but in fact export inspection had already lost all of its effectiveness; quality control among the Japanese photography companies was the highest in the world. The convergence of photography and electronics into digital imagery was made clear when a new competitor, i.e. Sony, introduced the world's first digital still video camera, the Mavica, in 1984. Furthermore, the creation of the Advanced Photo System consortium (composed of one American and four Japanese firms) in the late 1980s underlined the fact that the photography industry associations had lost their purpose in the 1990s. In response to the unbounded globalization of the industry and the blurred distinction between industries, MITI was unable to rally enough interest among the photography firms to

create a 1990s 'vision' statement for the Japanese photography industry. With a global photography industry composed only of transnational Japanese firms, Japanese bureaucrats were no longer in a position to exert much influence on the industry or on the individual firms.

There are six main points that sum up the objectives of this section. First, many government-industry analyses are general and draw highly generalized conclusions (e.g. Eads and Yamamura, 1987; Magaziner and Hout, 1980). The assumption that industries and firms behave in the same fashion regardless of what they produce leads to very general conclusions. Second, many scholars overlook the fact that Japan's industrial policy changed dramatically over the postwar period, particularly after the early 1970s (e.g. Callon, 1995; Fransman, 1990). The importance of a historical perspective has been clearly shown (e.g. Dore, 1986; Fruin, 1992; Vestal, 1993). Third, when it comes to government-industry relations and attitudes toward industrial policy, the US is more the exception than the rule. Two-country comparisons (usually US-Japan comparisons, e.g. Gerlach, 1992; Okimoto, 1989) generate only broad conclusions. Fourth, as the tendency to 'fit' data to a particular model or theory has grown (cf. Ramseyer and Rosenbluth, 1993), the general has taken priority over the specific masking important differences (as well as similarities) among industries and firms. Fifth, the strict boundaries between academic disciplines (e.g. between business and economics, economics and politics) must be crossed through, for example, the eclectic approach to improve our international political economy analyses. If, for example, this thesis had ignored the roles played by firms, technology or information flows in the evolution of the Japanese photography industry, the conclusions would have been very different. Finally, the rise of multinationals in the photography industry tells a universal story of the globalization of business. This is where there appears to be some degree of convergence among industries and firms; certain similarities (i.e. among industries and among firms) appear to have developed that cross national borders. However, the Japanese state still plays

an important role in negotiating FDI arrangements, especially with the authoritarian states of East and Southeast Asia.

Surprisingly little heed has been given to the success of Japan's export promotion/import protection strategy in Japan's economic 'miracle' and consequently few industries (particularly the non-strategic ones) have been studied in any depth. This is why this analysis of the Japanese photography industry is so important.

In the next two sections, rivalry and cooperation are presented as a general overview of Japan's postwar growth and expansion relative to the Japanese photography industry. To show how the balance between rivalry and cooperation shifted over time, the most salient examples of politician-bureaucrat, government-industry and firm-firm cooperation/rivalry are reviewed. It is clear that both rivalry and cooperation always existed in the Japanese photography industry, but that one usually took precedence over the other.

More cooperation, less rivalry, 1945-1973

Prior to the early 1970s, the bureaucrat-politician, government-industry, and firm-firm relationships were generally cooperative. The Japanese economy was devastated by WWII. It was geographically and politically isolated in Asia, and it was dependent on the US for military security. According to Lester Thurow (1992, p. 29), "[i]n 1950, the United States had a per capita GNP four times that of West Germany and fifteen times that of Japan."[5] Japan was still a minor economic power in 1960 (three percent of world GNP) as compared with the economies of Western Europe (Spero, 1990). The economy of the United Kingdom alone was twice the size of Japan at that time.

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[5] For comparison's sake, on a per capita basis, Japan received up to 1950 one-third of what the American zone in West Germany (with one-fifth of the population) was allocated by the US government for its initial recovery (Manchester, 1978, p. 598).

Article Nine of the postwar constitution prevents Japan from acquiring the means to wage war (Tsuru, 1996, pp. 28-29). US policy toward Japan's rearmament changed by 1952 to allow – and even encourage – Japanese firms to engage in arms manufacture. Richard Samuels (1994, pp. 131-132) notes that Japan's postwar constitution "leaves the legal status of weapons manufacture even more vague than it does the maintenance of military forces." Immediately after WWII, Japanese firms were restricted to manufacturing civilian or consumer products, that is, necessities or luxuries with a positive to high income elasticities of demand. The Allied Occupation's General Headquarters (GHQ) policy after 1948 was that Japanese industry should recover; the industries that were designated to be converted from military to civilian production were called *heiwa sangyo*, or 'peace industries.'[6] Camera/lens and film manufacturing belonged to this category (Seki, *et al*, 1961, p. 3). In the late 1940s, GHQ supplied Swiss machine tools to only four firms, Canon, Minolta, Nikon and Seiko, to help them recover. Most machine tools in operation at that time were of very poor quality (cf. Cohen, 1949). Since every firm could not be supplied with machine tools, only a handful were selected. Favoring a small number of firms is a fundamental aspect of US industrial policy which encourages *firm-firm rivalry* rather than cooperation. GHQ policy, it turns out, contrasted sharply with the Japanese government's post-Occupation policy of aiding many (but not all) firms enter the US market in the mid-1950s (see below).

In the late 1940s, the American business community enthusiastically supported the idea of opening up the Japanese market to US goods and the setting of a single exchange rate; they saw the potential of the Japanese market for American goods (cf. Tsuru, 1996; Mason, 1992). Technology imports (which were costly due to licensing fees) were needed by Japan to bring the economy on track, but they required far more foreign exchange (i.e. US dollars) than

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[6] GHQ (i.e. General MacArthur) was restricted from making economic policy after MacArthur rejected proposals contained in the Young Report in 1948 (Tsuru, 1996).

Japan's exports earned, so higher and higher value-added goods were promoted in order to cover the shortfall (cf. Abé, 1997; Krause and Sekiguchi, 1976). In an effort to begin bringing Japan's merchandise trade into balance, foreign exchange flows were controlled by the 'link system' which tied the allocation of foreign exchange for imports of, e.g. raw materials, to export performance (Itoh and Kiyono, 1988, pp. 169-173; 179 note 3).[7] The US government allocated federal funds to Japan to pay the cost of Japan's imports most of which originated in the US. Consumer goods made in Japan were channeled through US military post exchanges (PXs) located in Japan as 'domestic' exports to the US. Cameras and lenses manufactured by the firms that received the Swiss machine tools were required to supply 80 percent of their output to the PXs as exports. When US military personnel returned to the US, they took their cameras/lenses with them, creating a base from which export promotion could later take off.

In the photography industry, firms cooperated to re-establish prewar industry associations, but their efforts were not welcomed by GHQ on the grounds that firm-firm cooperation constituted anti-competitive behavior. After the Occupation ended in 1952, however, the industry associations (e.g. the Japan Camera Industry Association (JCIA) and the Photo-Sensitive Materials Manufacturers Association (PSMA)) were encouraged to reorganize by the Japanese government because they could act as information intermediaries between the firms within the industry and between firms and their relevant bureaucracy. Thus, there was both *government-industry and firm-firm cooperation* after 1952.

One of the key actors helping the camera industry at this time was politician Kinji Moriyama who helped set up the Japan Camera Inspection

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[7] In June 1948, Prime Minister Yoshida said, "As Japan lacks raw materials, she must depend upon their importation in order to export processed articles. The exportation of highly processed articles, therefore, is more profitable and desirable in obtaining dollars than that of coarse manufactured goods. In other words, the value of yen spent for obtaining dollars through export must be lower in the case of highly processed articles than in that of coarse goods." See "Economic Independence and Export," *Kogyo*, June 28, 1948 cited in Cohen (1949, pp. 495-496, note 186).

Institute (JCII) for the inspection of export goods. This was done to comply with the Export Inspection Law and to raise the standards of Japanese-made cameras and lenses. Moriyama worked on behalf of the photography firms to lower excise taxes (determined by bureaucrats) on cameras and film sold in Japan. Most consumer goods were luxuries for the average Japanese household in 1950, and as such were subject to excise taxes which dampened domestic demand. But exports and domestic sales were keys to the success of the photography industry and specifically to the exporting firms during the postwar period. Once the excise taxes had been significantly reduced, domestic demand for export-quality cameras and lenses grew quickly. Moriyama's involvement in the industry is an example of *politician-bureaucrat rivalry*. Over time, he became a *zoku* politician (i.e. a politician who works on behalf of a specific industry) for the photography industry (cf. Curtis, 1988).

To correct Japan's balance of payments, the US market was opened to Japanese exports in the early 1950s and sales of low-cost Japanese cameras/lenses grew. Japanese goods competed mainly with West German goods in the more specialized 35 mm market rather than other formats dominated by US manufacturers. West German cameras/lenses were of very high quality and enjoyed an excellent reputation, but Japanese goods were cheaper, so they gained market share quickly. Part of the JCIA's and the JCII's role was to sponsor camera shows and conduct market surveys to help establish a reputation of quality and reliability for Japanese cameras/lenses overseas. The camera information and service centers that were set up in New York (1955), Okinawa (1956), London and Dusseldorf (1963) were staffed by representatives of the JCIA member firms, the JCIA, the JCII and later by officials from the Ministry of International Trade and Industry (MITI) (JCIA, 1987; JCII, 1984). The centers were concerned with the service and sale of *all* brands of *exported* cameras/lenses and with spreading information about Japanese cameras in overseas markets. The JCII's inspection activities were directed solely at exported cameras/lenses. Thus, there was *government-*

industry cooperation in overseas marketing activities and *firm-firm cooperation* among exporters in building export markets.

Industry and government also cooperated in research to ensure that Japanese camera and lens designs were not merely copies of other manufacturers' designs. The Japan Machinery Design Center (JMDC) and the JCII cooperated to create the famous black-and-gold 'Passed' seal of assurance that exported cameras and lenses were of unique designs and were thoroughly inspected and tested for the highest quality. Another example of *government-industry cooperation* was on technological development for improving lens performance and production and developing automatic light metering systems. Most of this research was carried out at the JCIA (in cooperation with the member firms) in the 1950s, and the research carried out at Fuji Photo Film's laboratory on optic glass, for example, received funding from MITI.

After the 1964 Tokyo Olympics, firms that had expanded production capacity faced a recessionary climate and cut-throat price wars (i.e. 'excess competition'). The 12 leading JCIA member companies which controlled 80 percent of total Japanese camera production in 1965 applied for and were granted the right to form a recession cartel for one year (JCIA, 1987). The firms agreed to control retail prices (i.e. not engage in cut-throat pricing) and cut production of 35 mm cameras by 20 percent (JCII, 1984; Miyabayashi, 1963). This was another example of *government-industry cooperation*. At roughly the same time, MITI decided to withhold funds from the camera information and service center in New York and instead establish in 1963 four Light Machinery Centers in New York, London, Dusseldorf and Bangkok. The camera/lens manufacturers were forced to join the new centers, albeit somewhat reluctantly (cf. Yayama and Ito, 1988), since at that time they were Japan's most successful exporters of light machinery (cf. Miyabayashi, 1963). In this instance, there was some *government-industry rivalry*.

During the 1950 to 1973 period, Japan enjoyed an increasingly favorable foreign exchange rate at 360 yen to the dollar from 1949 until 1971. Japan's

stable exchange rate was important in helping Japanese firms build dominant market shares in the US by 1960 and in Europe by 1970. Tariffs, quotas, foreign exchange controls, export tax credits and restrictions on FDI and corporate ownership were some of the key components of export promotion and import protection that had allowed Japan's economy to recover quickly after the war, and helped the photography companies overtake and surpass all other camera/lens manufacturers globally by the early 1970s. Military and economic dependence on the US protected Japan from international pressure (which grew throughout the 1960s) to revalue the yen and to conform fully to international trading arrangements (e.g. the GATT, OECD and IMF charters) by lowering tariffs, eliminating quota restrictions and opening the market to foreign direct investment (FDI).

The period up to 1973 was characterized by economic expansion in the developed countries which meant rising incomes, more leisure time and the appearance of a consumer society. Because consumers had more money and free time (some of which was spent on holidays) than in the past, goods that had previously been perceived as luxury items were now demanded by a larger proportion of the population. Japanese photography firms invested in plant and equipment (particularly machine tools in the 1950s) to upgrade their product lines and expand manufacturing capacity to meet increased demand. Long-term lending through the Japan Development Bank (among others) was important in the early recovery years when firms needed to invest in new plant and equipment. Firms that received government lending, e.g. JDB loans, could easily obtain additional loans from commercial banks.[8] Expanded supply and demand translated into growth for many of the Japanese photography firms, particularly the exporters. Postwar economic expansion worldwide and Japan's economic recovery coincided during the 1945 to 1973

[8] As firms became more transnational, the need for development financing disappeared and performance replaced government guidance as an indicator of creditworthiness.

period, a time that was generally characterized by *government-industry cooperation* in the Japanese photography industry.

More rivalry, less cooperation, 1974-1995

Japan's promotion of high value-added exports and protection of the domestic market from imports allowed Japan to achieve a balance in its merchandise trade (exports minus imports of traded goods) in the early 1960s. However, the more important current account (net exports of goods and services minus net imports of goods and services, including invisible trade such as royalties paid on patents) did not begin to show a surplus until the late 1960s (Lincoln, 1988; Nakamura, 1981). The 1950 to 1973 period was one of economic recovery through an industrial policy of export promotion.

After 1974, export promotion was no longer possible since Japan's trading partners were beginning to react to the floods of Japanese goods entering their markets. Import protection had also run its course since Japan was forced to open the domestic market to international competition. By the late 1970s and especially throughout the 1980s, Japan's export trade grew very quickly resulting in considerable friction with Japan's trading partners, particularly with the US. Industrial policy pursued by the US had helped create a situation where most consumer goods were no longer manufactured in the US. Many US multinationals were being supplied by Japanese firms on an original equipment manufacturer (OEM) basis. This did not apply to infrastructure or services, e.g. finance, housing, roads and highways and retailing, which have flourished in the US. Most American firms (in e.g. ships, aircraft, weapons, space-related technology and computers) became highly dependent on defense contracts for their direction and livelihood (cf. Florida and Kenney, 1990; Melman, 1971).[9] To compete with the Soviet Union, many

[9] Samuels (1994) discusses how the Japanese economy which is highly dependent on consumer goods industries has generated economic growth successfully, without dependence on military industries, quite unlike the US.

invested in military-related R&D and concentrated on developing new military-use technologies rather than consumer goods.

During the Occupation of Japan, American expectations had been that most of Japan's post-WWII restrictions on trade and investment would be removed relatively quickly after economic recovery had been achieved. For most of the 1945 to 1973 period, however, the US market was opened to Japanese goods, but the Japanese market remained closed to imports which competed with foreign exchange-earning exports. FDI to Japan was limited to those few large US firms that were willing to part with some of their technological know-how (Itoh and Kiyono, 1988; Mason, 1992; Encarnation and Mason, 1990; and Tsuru, 1996). According to Kinji Moriyama (Yayama and Ito, 1988, p. 335), the secret to the photography industry's success was that the developed countries "turned a blind eye to [Japanese imported] cameras" (*kamera gurai oome ni mite yaro*) because the Japanese economy was perceived as being weak. Without the open export markets in the US in the 1950s and in Europe in the 1960s, the photography industry might never have recovered or prospered.

Until the early 1970s, the Japanese government avoided opening the domestic market to imports, complying with international trading norms and removing restrictions on, e.g. FDI, by playing off the conflicting interests (i.e. security, diplomacy and trade) of the US Pentagon, Commerce and State Departments. But the American government grew less and less tolerant of Japan's seemingly closed market once the US-Japan bilateral trade balance got too far out of hand, particularly during the 1980s (cf. Tyson, 1992). Trade became a major American political issue in the US due to the recessions of the 1970s and pressure on Japan to become more like the US (i.e. to have an open, transparent economy in which firms operate on a level playing field) continued to mount throughout the 1980s and the 1990s. Americans also became concerned that military security had compromised their nation's economic security.

Because of the legacy of WWII, Japan was an unwelcome political and trading partner in Asia until the mid-late 1980s when Japanese investments were seen as an alternative to the fading American presence (Lincoln, 1993; Magaziner and Hout, 1980). When the East Asian newly industrializing countries (NICs), the second-tier NICs and then China took off, more of the world's attention was focused on the economies of Japan and East Asia.[10] It became the new growth area four decades after the end of WWII and American firms wanted to take advantage of it. Suddenly, many American firms became interested in investing in Japan and elsewhere in East Asia.

Japan's levels of foreign direct investment (FDI) rose substantially in the 1980s, and firms in the photography industry were quick to develop marketing and distribution in the East and Southeast Asian markets through FDI. Firms used FDI to sustain and control trade through the establishment of local distribution networks, much as they had done in the US and Europe (cf. Encarnation, 1992). Later in the 1980s when the yen became too strong for firms to manufacture profitably in Japan, the photography firms moved assembly and production into the region. Firms typically did this in a follow-the-leader pattern reflecting the degree of *firm-firm rivalry* that existed. Good relationships with subsidiary firms were important throughout the period, but changed in degree and in kind as the needs of the industry changed. Once manufacturing moved overseas and price pressures on production in Japan became intolerable due to the high yen (after 1985), supplier relationships became strained and were often replaced solely by price-quality considerations.

Photographic film manufacturers faced a very different climate when they attempted to repeat for film the export promotion strategies which had worked so well for their cameras/lenses. Because the film manufacturers also produce cameras and lenses (they were always ranked among the top seven

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[10] The NICs are South Korea, Taiwan, Hong Kong and Singapore; the second-tier NICs are Thailand, Malaysia, Indonesia, and the Philippines.

producers in terms of sales for all types of cameras/lenses), they were already experienced in successful export promotion and import protection for cameras/lenses. In the 1970s, however, export promotion was no longer a practical option; the Japanese market could no longer be protected by tariffs, quotas and various capital controls, and Japanese exports became less welcome in the US and Europe. *Government-industry cooperation* (including with the JCIA and the PSMA) was needed, according to MITI and the firms, to organize camera/lens and film distribution in the Japanese market to achieve retail price maintenance and prevent powerful foreign competitors from gaining significant market share through price wars.

Once Japanese import quotas and restrictions were lifted in the late 1960s and early 1970s, Japanese firms manufacturing cameras/lenses (i.e. not photographic film) were world leaders and therefore no longer susceptible to foreign competition or takeovers. The film manufacturers (i.e. Fuji Photo Film and Konica) were not as strong and they chose two different routes to manage the inevitable — competition in an open world market. Fuji Photo Film purchased controlling shares in several major wholesalers to secure its huge 70 percent domestic market share.[11] The remaining 30 percent was divided among Konica (20 percent), Kodak (7 percent) and Agfa (3 percent) in 1995. Konica which was less keen on government-industry cooperation and more inclined to firm-firm rivalry chose not to pursue such an extensive distribution *keiretsu* scheme.[12] The '*keiretsu*-ization' (*keiretsuka*) of film distribution pursued by Fuji Photo Film is considered to be anti-competitive behavior by free traders. From the mid-1980s onwards, the US engaged Japan in various bilateral talks to deregulate the Japanese market to allow access by foreign companies (cf. Prestowitz, 1988), and recent US-Japan talks have addressed the *keiretsu*-dominated distribution system. It was unsuccessfully argued by the

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[11] Fuji Photo Film's wholesalers apparently keep Fuji film on the retailers' shelves, not the other brands (cf. Dewey Ballantine, 1995a and 1995b).

[12] Konica consistently innovated camera/lens technologies over the postwar period and developed its own copiers, but its contributions to advancing photographic film technology suffered.

US (for Kodak) that the distribution system (dominated by Fuji Photo Film) acts as a non-tariff barrier to firms (e.g. Kodak and Agfa) which are not part of the system (cf. Dewey Ballantine, 1995a and 1995b; Katz, 1998).[13]

Firm-firm rivalry is especially keen in mature industries where market shares have been established. Once the Japanese camera/lens manufacturers had triumphed in the US and Europe by the early 1970s, firm-firm rivalry among them intensified. Many of the leading firms (e.g. Canon, Minolta, Konica and Fuji Photo Film) diversified into other optics-based products (e.g. photocopiers, facsimile machines, steppers, gastrocameras and endoscopes) (cf. Fruin, 1992). Intense firm-firm rivalry in national and global markets has also fed pressures to achieve economies of scale in the photography industry. Their challenge was to expand their markets enough to satisfy demand through large-scale production. Large production volumes also meant that prices would be kept low which was important as cameras/lenses came to be more technologically complex.

Canon used an American television ad campaign in 1976 to build product recognition for the Canon AE-1, the world's first computerized camera. Their aim was to raise awareness of the Canon brand and to expand Canon's US market share which was until that time comparatively low (Sandoz, 1997). The trend of 35 mm SLR cameras as mass produced, mass market goods (i.e. high quality cameras sold at very reasonable prices) began after that time with Canon in the lead. Computerization and the use of a central processing unit in each camera reduced the number of camera parts from around 1,300 to roughly 300 parts. As a result, cameras became more reliable and cheaper to produce (Sandoz, 1997, p. 110).[14] When Minolta introduced its Alpha-7000 autofocus SLR camera in the mid-1980s, it stole the leading position from Canon which had held the top spot since 1976 with the

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[13] This was the crux of the unsuccessful WTO case brought by the US government on behalf of Kodak against the Japanese government and Fuji Photo Film.
[14] The sales price of the SLRs fell by between $100 and $150.

AE-1.[15] Canon retaliated launching the EOS camera two years later and a swift, intense battle ensued between Minolta and Canon for the number one spot in the industry. Nikon joined in somewhat later with its own autofocus SLR line. The situation was similar in the photography industry in the 1980s, as Kodak and Fuji battled over which firm could introduce the highest-speed film. *Firm-firm rivalry* over world market shares thus became the norm in the 1980s.

Globalization of the industry based on global sales has in recent years led to global production, i.e. manufacturing in East Asia, Europe and North America, for a few firms.[16] Firms' decreasing dependence on bank financing in the 1980s may mean the weakening of their bank ties and other problems for Japan's financial system (Hoshi, 1994).[17] Japan's banking industry's current troubles and the recent increase in foreign ownership of Canon and Fuji Photo Film (roughly 40 percent each in 1996) indicates that there may be some truth in the notion that *keiretsu* ties are becoming progressively looser, and that firm-firm rivalry might well intensify.

MITI's VLSI Project (1976-1980) enhanced knowledge creation and knowledge flows among the photography and electronics industries through *government-industry cooperation* (cf. Fransman, 1990; Sigurdson, 1986). However, the project helped two camera/lens firms, i.e. Canon and Nikon, develop stepper technology (for the photolithography fabrication of semiconductors) which allowed them to diversify into a new product line. Canon and Nikon now control global stepper manufacturing. When in 1981 Sony launched the Mavica, the world's first digital still video camera, *firm-firm rivalry* crossed traditional industry lines. At the same time, *firm-firm cooperation* across national borders came in the form of the Advanced Photo System (APS) consortium (composed of Kodak, Canon, Fuji Photo Film, Minolta and Nikon).

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[15] The Alpha-7000 was called the Maxxum in the US market and the Minolta 7000 AF in Europe (Lewis, 1991, p. 178).

[16] This trend has not been unique to the photography industry or industry in Japan (Strange, 1994, p. 183).

[17] According to Hoshi (1994, p. 290) "[a]n industrial firm may develop a main bank relationship without being involved in a *kigyo shudan* [corporate group or horizontal *keiretsu*]."

Their aim was to cooperate in developing new, international standards and equipment for the 24 mm APS film format, which was sold as a higher resolution film than the traditional 35 mm format. Risk against product failure was spread across the five consortium members, an important consideration for Kodak. In Japan, because only four of the seven leading photography firms were included in the consortium, APS challenged traditional government-industry relations and acted as one more nail in the coffin of government-industry cooperation. Thus, the 1974 to 1995 period was characterized mainly by *government-industry rivalry*.

Future research directions

In the photography industry in the 1950s and 1960s, the Japanese government appears to have prevented industry leaders from gaining an unfair advantage over weaker firms. In the interests of *all* firms (i.e. not favoring one firm over another), policies were implemented to encourage weaker firms to keep up with the market leaders. Such policies were a double-edged sword; they created a more level playing field for weaker firms while they restrained market leaders from pulling too far ahead. Government intervention in the photography industry during the early postwar years (1950-1973) favored camera/lens firms that would best be able to export high value-added goods to the US and European markets. Policies (i.e. through the JCIA and the JCII) were designed to help a relatively large group of firms, not just one or two. In doing so, Japanese bureaucrats effectively prevented the leading camera/lens firms from creating a monopolistic industrial structure. Instead, they favored a large oligopoly. In photographic film, there is an oligopolistic structure with only two firms because the magnitude of capital needed to challenge the industry leader, Kodak, which was a first mover in the industry (cf. Chandler, 1988), acted as a strong barrier to new entrants. That two of the four world-class film makers have Japan as their nation of origin is quite unusual.

Many industries in Japan are characterized by a large number of successful firms due to the 'one-set principle,' meaning that there ought to be at least six firms in each industry, one from each of the six horizontal *keiretsu* groups. As discussed in chapters four and five, there was wide variation among the Japanese camera/lens and film firms in terms of *keiretsu* membership and degree of cooperation with the government. Member firms of *keiretsu* groups have not always concurred with bureaucratic guidance (e.g. the automobile industry and the steel industry, cf. Johnson, 1982), therefore *keiretsu* affiliation is not always a reliable guide to firm behavior.

Returning to the original question posed in this thesis: have Japanese firms or the Japanese government driven the success of the Japanese photography industry? This thesis shows that some companies have been successful *despite* government involvement, while others have been successful *because of* it. Government policy and firm behavior are interdependent. A firm's decision whether to cooperate with government policies or not may depend on how much power firms have to affect their own profitability and survival. Their actions may at times look like coordination with government policy and at other times not. Policy may at times be shaped by or may be formulated to support (or legitimize) events that are already occurring, a system that works, or something that may have emerged out of practical realities, not because omniscient bureaucrats agreed to set forth policies that organized the firms to respond in certain predictable ways. In the photography industry, when bureaucrats thought they were losing control over the firms, they sought to (re)assert their power. One reason for their actions was that much of the postwar system was in flux during the early 1970s, and bureaucrats may have felt that they were in danger of losing their *raison d'être* (cf. Johnson, 1982).

Government influence was most important in the early years particularly because of the tight controls that were placed on the industry during the recovery period. But the influence of the government waned as the

firms within the industry prospered. US foreign policy objectives aided the Japanese photography industry. Japan's economy was very weak in the 1950s and 1960s, and it took years for the image of poor quality Japanese manufactures to disappear. Government influence after 1974 was not always desirable (from the firms' point of view) and not always effective. Over time, formulating a policy consensus to promote economic growth before all else was challenged domestically and internationally; appropriate government guidance became more elusive. Depending on the incentives to cooperate and the firm's sense of obligation to go along with the government, firms cooperated with government initiatives to varying degrees. The rise of MNCs and the opening of the Japanese market to international competition went roughly hand-in-hand with the decline in government control over Japanese industry, except in the area of FDI negotiations with East and Southeast Asian governments.

In the increasingly globalized world economy, exporting firms can take advantage of opportunities (e.g. transfer pricing, proximity to customers and markets, lower transport costs and faster response times to local needs) and minimize constraints to their profitability (e.g. tax and labor laws, trade and investment restrictions). Government tax breaks and FDI incentive packages may be crucial to FDI decisions and the most robust firms look worldwide for strategic advantages.

Time plays an important role in determining which firms survive and which do not. It is quite likely that Japan's photography industry will continue to mature and of the current leading photography (i.e. camera/lens and film) firms only a few will be able to remain globally competitive in those products in the future. The evidence from this thesis indicates that firms which remain dependent on narrow, bureaucratic interests and on the domestic market for production and sales may not survive the current recession in Japan and are unlikely to be the global business leaders of the future.

The difficulty of moving beyond a market-state analysis has been highlighted in this concluding chapter. Any account that is dependent on actors as the core of the analysis, e.g. bureaucrat, businessman or politician, is skewed by personal experience, interpretation and/or ideology. What is missing is balance, i.e. drawing on the experiences and perspectives of all who were involved in Japan's economic recovery, not only bureaucrats, businessmen, and politicians. The problem is how to achieve this goal.

Instead of relying solely on industrial policy, this thesis sought to develop a broad international political economy perspective through an eclectic approach. We need to go beyond the limitations of traditional political and economic analysis by considering, e.g., firms, technology, security, human interaction and information flows, different types of authority/power and how all these factors change over time. Strange (1994) stresses the importance of using a broad framework within which a large variety of factors can be accounted for without emphasizing the importance of one over another but while stressing their interlinkages. And by asking the central question 'who benefits?,' the path to de-mystifying how the Japanese economy recovered and prospered in the postwar period, using the photography industry as the case analyzed, becomes clearer.

Some important questions have been raised in this thesis specifically about Japan's industrial policy toward the photography industry and generally about the Japanese economy. First, is the photography industry representative of what has been identified above as 'recovery industries' (i.e. cameras/lenses, sewing machines, bicycles and clocks/watches)? Do the camera/lens manufacturers represent a group of firms that were forced by GHQ to export goods to bring in foreign exchange (i.e. US dollars) to pay for the recovery of the Japanese economy after WWII? Do the film manufacturers (which also made cameras and lenses) represent a group of firms that were able to benefit or learn from the export promotion and import protection arrangement, and then attempt to repeat it after export promotion and import

protection were no longer viable? The evidence suggests that that the answers to all of these questions is yes.

US foreign policy encouraged Japanese economic recovery based on exports to an open US economy, and because of that policy the US government turned a blind eye to what Japanese goods did to the competition (both American and European) in the US market. In other words, the US overlooked Japan's export promotion and import protection policies because security (i.e. having Japan as a bulwark against Communism in Asia) took priority in the perception of the national interest.

Only after US foreign policy shifted toward developing friendly relations with China in the early 1970s did criticism of Japanese export practices begin to get heard in Washington. American manufacturers of, for example, color televisions and automobiles had to compete with inexpensive, high-quality Japanese goods which had ready access to the US market. In the 1980s, as Japanese firms moved into exporting higher and higher value-added goods to the US (e.g. various road vehicles, computers and semiconductors) complaints by US firms grew and issues of equal market access in Japan for American firms became part of the US government's agenda.

American policy toward Japan, especially from 1949 to the early 1970s, is one of the main reasons why Japanese firms have exported so successfully to the US and to the world. Clearly, US military security policy was disconnected from US economic security policy for several decades after WWII. Once these interests converged, e.g. when American firms specializing in dual-use technologies (i.e. consumer goods as well as military goods) were threatened by Japanese imports, both military and economic security became important US foreign policy goals (cf. Samuels, 1994). Books and articles about how Japan became, to quote Ezra Vogel (1979 and 1985), 'number one' and how the US should 'comeback' illustrate just how important the study of Japan and the implications of Japan's economic strength for US foreign economic and strategic policy have become.

The evidence from this thesis suggests that the backbone recovery industries (e.g. cameras/lenses, sewing machines, clocks/watches and bicycles) tell quite a different story about Japan's political economy than the so-called strategic industries (e.g. steel, automobiles, computers and semiconductors). This is important because much of the popular understanding about Japan's postwar economic 'miracle' is informed — or misinformed — by studies of these 'strategic' industries. Many of these studies over-emphasize the role of the state (i.e. the bureaucrats) or the role of market forces (cf. Johnson, 1982; van Wolferen, 1990). Popular myths about Japan (e.g. Japan's East Asian production network which was orchestrated by MITI to deflect bilateral trade conflicts, Hatch and Yamamura, 1996) might reflect a particular agenda because they do not take account of important factors (e.g. the growing global nature of Japanese business, not dependent on guidance from MITI) that have shaped Japan's postwar economy. This thesis indicates that there is much to do to in order to develop the international political economy analyses on Japan and one step in that direction would be to analyze other similar industries that were promoted via exports in the early recovery years.

The second important question raised by this thesis is whether Japan's industrial structure has become dependent on exports. Many scholars have described the 'dual structure' of the Japanese economy as having an efficient export-oriented manufacturing sector and an inefficient domestic sector (e.g. distribution, construction, tobacco and services) (Vestal, 1993; Calder, 1993; Katz, 1997).[18] If this is so, Japan has become dependent on its very efficient export sector to cover its high dependence on imports (of e.g. oil and primary commodities) and the high costs associated with an inefficient domestic production and distribution system. Evidence from the photography industry indicates that camera/lens firms' experience with export promotion during the

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[18] Nakamura (1981) discusses a different dual structure (*niju kozo*) in the prewar period, namely the simultaneous existence of a modern industrial economy and traditional cottage industry.

recovery period (and with the help of US policies) was utilized when photographic film exports took off in the 1970s. The success of Japan's export firms may have been the engine behind Japan's economic growth, but can this continue into the future?

If exports do drive the Japanese economic growth, can the current trend toward the globalization of business (i.e. the independence of firms from their home economies) be reconciled with Japan's dependence on exports? How will the economy respond if the export-oriented companies continue to behave as other multinationals and choose more or less where they want to pay taxes, which labor policies suit them, which type of corporate financing and what kind of capital markets meet their needs? To answer these questions, further research is needed on specific recovery industries that covers a reasonably long historical period (perhaps including the prewar period) and takes an eclectic, interdisciplinary approach combining history, economics, politics, international relations and business. In this way, we can begin to put Japan's government-industry relationship throughout the postwar period into a wider perspective.

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